United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
Illinois Agricultural
Experiment Station

Soil Survey of Jasper County, Illinois

How To Use This Soil Survey

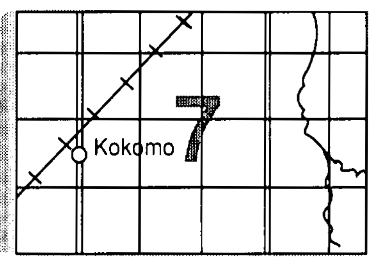
General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

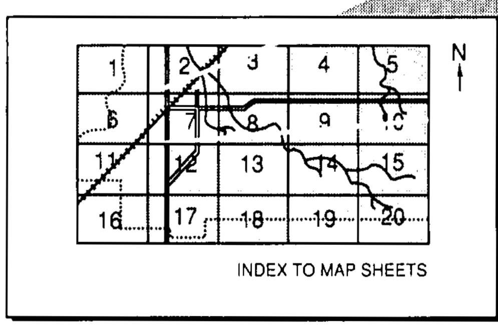
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.



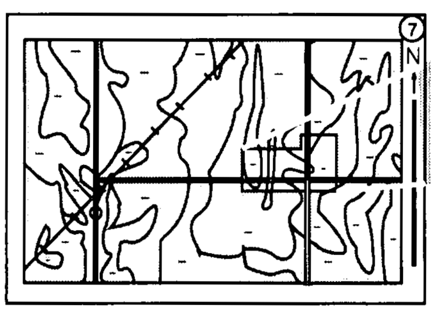
MAP SHEET

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.

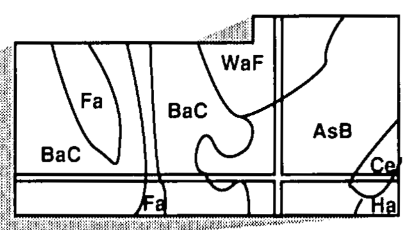


INDEX TO MAP SHEETS

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



MAP SHEET



AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1985. Soil names and descriptions were approved in October 1986. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1986. This survey was made cooperatively by the Soil Conservation Service and the Illinois Agricultural Experiment Station. It is part of the technical assistance furnished to the Jasper County Soil and Water Conservation District. The cost was shared by the Jasper County Board and the Illinois Department of Agriculture.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

This soil survey is Illinois Agricultural Experiment Station Soil Report 136.

Cover: Farmland near Ste. Marie. Richview and Hoyleton soils are in sloping and gently sloping areas. Cisne soils are in the nearly level areas.

Contents

Issued June 1992

Index to Map Units

Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in Jasper County, Illinois. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow over bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Charles Whitmore
State Conservationist
Soil Conservation Service

Soil Survey of Jasper County, Illinois

By Mark W. Bramstedt, Soil Conservation Service

Soils surveyed by Mark W. Bramstedt and William R. Kreznor, Soil Conservation Service, and Bryan C. Fitch, Roger T. Risley, and Bradley S. Simcox, Jasper County

United States Department of Agriculture, Soil Conservation Service, in cooperation with the Illinois Agricultural Experiment Station

JASPER COUNTY is in the southeastern part of Illinois (fig. 1). It has an area of about 319,100 acres, or 499 square miles. It is bounded on the north by Cumberland and Clark Counties, on the east by Crawford County, on the south by Richland and Clay Counties, and on the west by Clay and Effingham Counties. In 1980, the population of the county was 11,318. Newton, the largest town in the county and the county seat, had a population of 3,186 *(15)*. Jasper County was organized from part of Crawford County in 1831. Earlier it was part of the Northwest Territory *(10)*.

This soil survey updates the survey of Jasper County published by the University of Illinois in 1940 *(9)*. It provides current soil interpretations and has larger maps, which show the soils in greater detail.

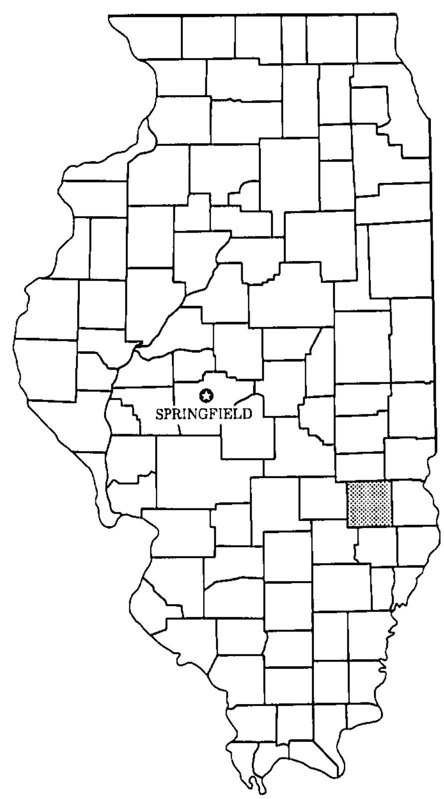


Figure 1.—Location of Jasper County in Illinois

General Nature of the County

The following paragraphs provide general information about the county. They describe transportation facilities and industry; natural resources; relief, physiography, and drainage; and climate.

Transportation Facilities and Industry

Jasper County has a well developed network of transportation routes. State Highway 33 crosses the county from east to west, and State Highway 130 crosses the county from north to south. These highways intersect at Newton. Several all-weather roads provide

access to the rural areas. Railroads furnish freight service.

The county has several light industries and a large power plant. The industries include manufacturers of electrical parts, clothing, and oil well equipment. The power plant generates electricity by burning coal. It is located at Newton Lake. The utility company that operates the power plant provides electricity and natural gas to much of southeastern Illinois.

Natural Resources

Bryan C. Fitch, soil scientist, Jasper County, helped prepare this section.

Soil is the chief natural resource in Jasper County. Agriculture influences the local economy. Most industries in the county are either directly or indirectly dependent upon agriculture and agricultural products. In 1982, the county had 1,017 farms. The average farm size was 260 acres. The acreage used for farms was about 84 percent of the total land area. Soybeans were grown on about 110,000 acres, corn on 81,000 acres, and winter wheat on 21,000 acres. Smaller acreages were used for pasture and hay, oats, grain sorghum, or fruit crops *(15)*.

In 1982, the total number of livestock farms was 521. The county had 16,367 head of cattle, which included about 2,200 head of dairy cattle. During the same year, it had 77,425 swine. Other livestock included sheep, poultry, goats, and horses.

About 18,000 acres in the county is woodland. Much of this acreage is unimproved land along the major drainageways. Deer, squirrel, raccoon, songbirds, and other wildlife inhabit these areas. Some of the hardwoods are selectively cut for sawlogs.

The county has two large lakes, more than 700 acres of smaller lakes and ponds, and more than 100 miles of major streams. Newton Lake is 1,750 acres in size. It provides cooling water for the coal-fired power plant *(4)*. The lake at Sam Parr State Park is 183 acres in size *(14)*. Sunfish, largemouth bass, crappie, catfish, bluegill, and other game fish inhabit these waters.

Much of Jasper County is underlain by deposits of oil, natural gas, and coal. In 1982, the county produced 864,564 barrels of crude oil from 812 wells. The first oil well was brought into production in 1940. Since then, the county has produced more than 51 million barrels of crude oil. Coal reserves are estimated to be over 3 billion tons. The coal is more than 350 feet below the surface *(17)*. Approximately 24,000 tons of coal has been mined. Currently, none of the mines in the county are active.

Deposits of sand are in scattered, small areas along the major rivers in the county. Several small sand pits provide material for construction.

Relief, Physiography, and Drainage

Relief is low in Jasper County. Elevation ranges from 624 feet above sea level at Island Grove to 440 feet above sea level where the Embarras River crosses the county line into Crawford County.

The county is part of the Springfield Plain, which lies within the Till Plains Section of the Central Lowland Province *(7)*. This province is the low Midwestern basin that formed from weak Pennsylvanian rocks, which had eroded to a level plain prior to the glacial period. The Springfield Plain is a nearly level plain formed of till deposited by the Illinoian glacier. This till overlies till deposited by the Kansan glacier. The total depth of the two kinds of till averages about 35 feet. The till plain is covered by 2 to 4 feet of loess and other sediments at the surface of the Illinoian till. In places, considerable mixing with the till has occurred and the loess cannot be clearly identified. The soils in the county formed mainly in loess and the underlying sediments at the surface of the Illinoian till on uplands. In some areas the loess is underlain by a strongly developed paleosol that formed in the Illinoian till.

Most of the county is drained by the Embarras River and its tributaries. These streams flow into the Wabash River. The southwestern part of the county is drained by tributaries of the Little Wabash River, which also flows into the Wabash River.

Climate

The Illinois State Water Survey helped prepare this section.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Effingham in the period 1951 to 1980. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 30.6 degrees F and the average daily minimum temperature is 21.6 degrees. The lowest temperature on record, which occurred at Effingham in January 1977, is -24 degrees. In summer, the average temperature is 75 degrees and the average monthly maximum temperature is 87 degrees. The highest recorded temperature, which occurred at Effingham on July 14, 1954, is 111 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 38.45 inches. Of this, 22.12 inches, or about 58 percent, usually falls in April

through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 16.05 inches. The heaviest 1-day rainfall during the period of record was 5.66 inches.

The average seasonal snowfall is 19.9 inches. The greatest snow depth at any one time during the period of record was 13 inches. On the average, 27 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are named and mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The general soil map of Jasper County joins with the maps in the soil surveys of Clark, Effingham, and Richland Counties. In some areas the soil names do not exactly agree across the county line because different map scales resulted in variations in the degree of detail or because the same soils were not identified in both counties. The soils and the parent material in these areas are similar, and the soils have similar use and management requirements.

Soil Descriptions

1. Cisne-Hoyleton-Darmstadt Association

Nearly level to gently sloping, poorly drained and somewhat poorly drained, silty soils formed in loess and the underlying sediments; on uplands

This association consists of soils on broad flats in the uplands. It is relatively undissected by drainageways. The Cisne soils are in broad, nearly level areas. The Hoyleton and Darmstadt soils are on ridges, on knolls, and on side slopes at the head of drainageways. The major soils formed under mixed forest and prairie vegetation. Slope generally ranges from 0 to 5 percent.

This association makes up about 45 percent of the county. It is about 64 percent Cisne and similar soils, 15 percent Hoyleton and similar soils, 15 percent Darmstadt soils, and 6 percent minor soils (fig. 2).

The Cisne soils are nearly level, poorly drained, and very slowly permeable. Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is friable silt loam about 9 inches thick. The upper part is grayish brown and mottled. The lower part is light gray and light brownish gray. The subsoil is mottled silty clay loam about 43 inches thick. The upper part is gray and light gray and is friable. The next part is grayish brown and firm. The lower part is light brownish gray and firm. The underlying material to a depth of 70 inches or more is dark grayish brown, mottled, firm silt loam.

The Hoyleton soils are very gently sloping and gently sloping, somewhat poorly drained, and slowly permeable. Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is brown, friable silt loam about 7 inches thick. The subsoil extends to a depth of more than 60 inches. It is mottled and firm. The upper part is brown and yellowish brown silty clay loam. The lower part is yellowish brown silt loam.

The Darmstadt soils are nearly level to gently sloping, somewhat poorly drained, and very slowly permeable. They have a high content of sodium in the subsoil. Typically, the surface layer is dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is light brownish gray, mottled, friable silt loam about 6 inches thick. The subsoil is about 38 inches thick. It is mottled and firm. The upper part is brown silty clay. The next part is grayish brown silty clay loam. The lower part is light brownish gray silty clay loam. The underlying material to a depth of 60 inches or more is light brownish gray, mottled, firm silty clay loam.

Of minor extent in this association are the poorly drained Huey, very poorly drained Shiloh, and moderately well drained Tamalco soils. Huey soils have a high content of sodium in the subsoil. They are closely intermingled with areas of the Cisne soils. Shiloh soils have a thick, dark surface soil. They are in

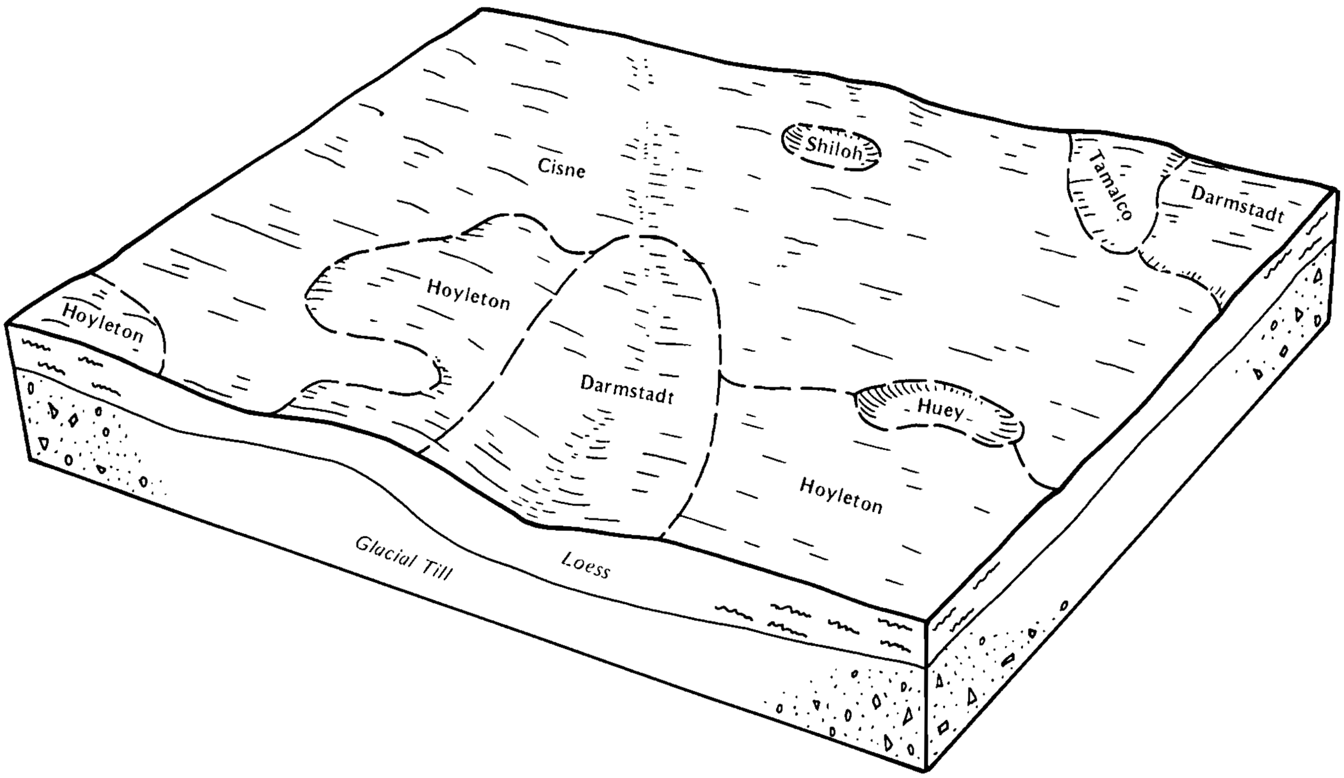


Figure 2.—Typical pattern of soils and parent material in the Cisne-Hoyleton-Darmstadt association.

depressions below the major soils. Tamalco soils have a high content of sodium in the subsoil. They are on knolls and ridges.

Most areas are used for cultivated crops. Some areas are used for pasture or hay. This association is moderately suited or well suited to the crops commonly grown in the county. It is well suited to pasture and hay. The seasonal high water table in all areas and the erosion hazard in the very gently sloping and gently sloping areas are management concerns. Also, the high content of sodium in the Darmstadt soils results in moisture stress during dry periods and excess moisture during wet periods. The sodium restricts the availability and uptake of some plant nutrients. This association is moderately suited or well suited to openland and woodland wildlife habitat.

This association generally is poorly suited to dwellings and septic tank absorption fields. The seasonal high water table, the shrink-swell potential, and the slow or very slow permeability are limitations that affect these uses. The high content of sodium in the Darmstadt soils also is a limitation.

2. Bluford-Wynoose-Atlas Association

Nearly level to strongly sloping, somewhat poorly drained and poorly drained, silty soils formed in loess and the underlying sediments or in glacial till; on uplands

This association consists of soils on broad flats, on ridges and knolls, and on gently sloping to strongly sloping side slopes along drainageways. The Bluford soils are on nearly level and gently sloping ridges and knolls and on gently sloping side slopes along drainageways. The Wynoose soils are in broad, nearly level areas. The Atlas soils are on sloping and strongly sloping side slopes along drainageways. The major soils formed under forest vegetation. Slope generally ranges from 0 to 15 percent.

This association makes up about 38 percent of the county. It is about 46 percent Bluford and similar soils, 21 percent Wynoose and similar soils, 17 percent Atlas and similar soils, and 16 percent minor soils (fig. 3).

The Bluford soils are somewhat poorly drained and are moderately slowly permeable or slowly permeable. They formed in loess and in the underlying sediments at

the surface of Illinoian till. Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsurface layer is brown and pale brown, mottled, friable silt loam about 7 inches thick. The subsoil is about 39 inches thick. It is mottled and firm. The upper part is pale brown silty clay loam. The next part is light brownish gray silty clay loam. The lower part is light brownish gray, slightly brittle silty clay loam. The underlying material to a depth of 60 inches or more is grayish brown, mottled, firm silt loam.

The Wynoose soils are poorly drained and are very slowly permeable. They formed in loess and in the underlying sediments at the surface of Illinoian till. Typically, the surface layer is dark grayish brown, friable silt loam about 7 inches thick. The subsurface layer is light brownish gray, mottled, friable silt loam about 10 inches thick. The subsoil is about 29 inches thick. It is mottled and firm. The upper part is grayish brown and light brownish gray silty clay. The lower part is light brownish gray silty clay loam. The underlying material to a depth of 60 inches or more is gray, mottled, firm silt loam.

The Atlas soils are somewhat poorly drained and are very slowly permeable. They formed in Illinoian glacial till that has a strongly developed paleosol. Typically, the surface layer is brown, friable silt loam or silty clay loam about 6 inches thick. It has been thinned by erosion. The subsoil extends to a depth of more than 60 inches. It is mottled. The upper part is dark yellowish brown, firm silty clay loam. The next part is grayish brown, very firm silty clay. The lower part is light gray, firm clay loam.

Of minor extent in this association are the moderately well drained Gosport, well drained Hickory, and somewhat poorly drained Wakeland soils. Gosport and Hickory soils are on steep and very steep side slopes below the major soils. Gosport soils formed in material weathered from shale. Hickory soils formed in glacial till. Wakeland soils formed in alluvium on flood plains below the major soils.

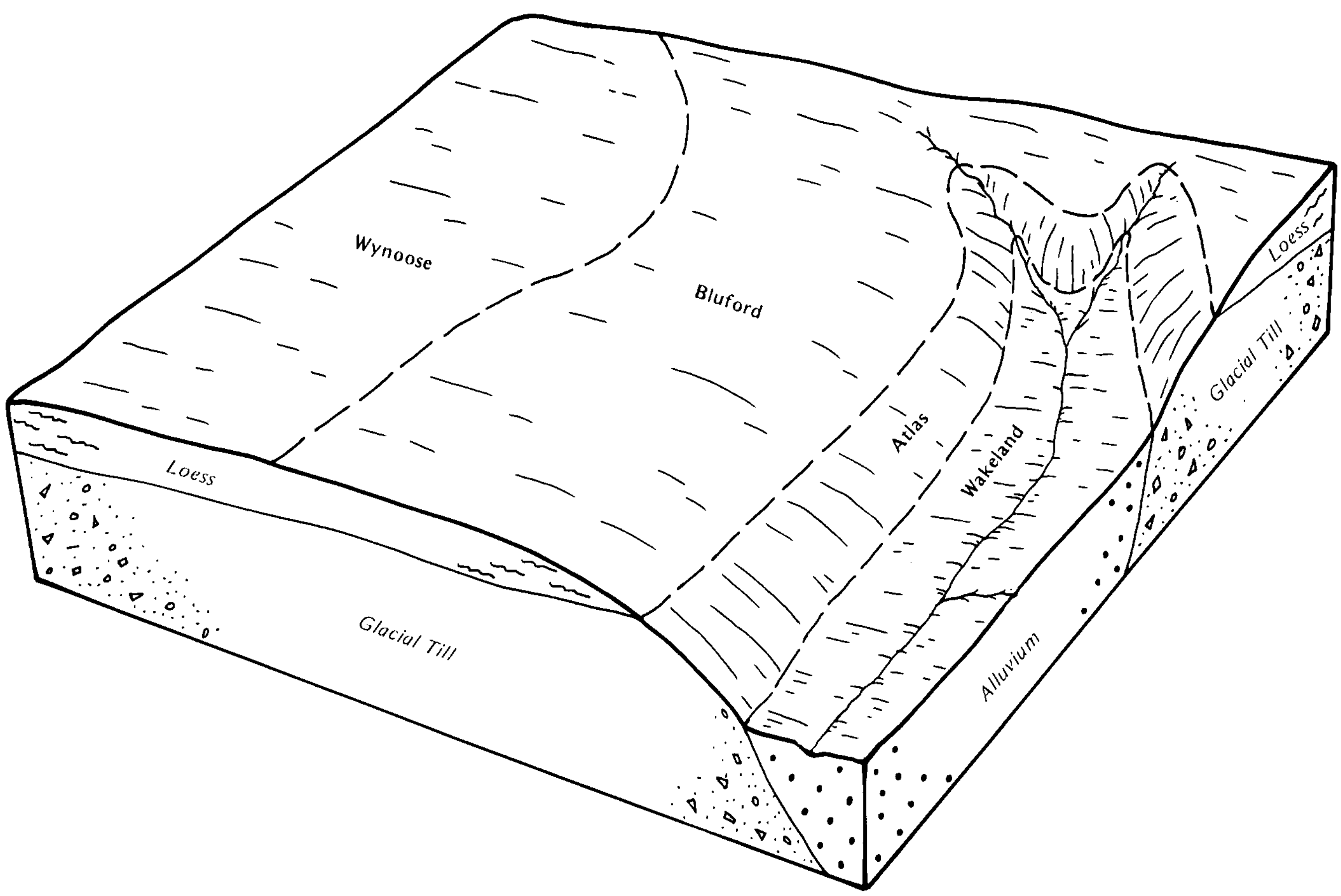


Figure 3.—Typical pattern of soils and parent material in the Bluford-Wynoose-Atlas association.

Most areas are used for cultivated crops, pasture, or hay. Some are used for woodland. The Bluford soils are well suited to cultivated crops, pasture, and hay. They are moderately suited to woodland. The Wynoose soils are moderately suited to cultivated crops, pasture, and hay. They are poorly suited to woodland. The Atlas soils are moderately suited, poorly suited, or generally unsuited to cultivated crops. They are moderately suited or well suited to pasture and hay. They are moderately suited to woodland. This association is moderately suited or well suited to habitat for woodland wildlife.

This association is poorly suited to dwellings and septic tank absorption fields. The seasonal high water table, the shrink-swell potential, and the slow or very slow permeability are limitations that affect these uses.

3. Thebes-Alvin Association

Gently sloping to steep, well drained, silty and loamy soils formed in loess and the underlying sandy material or in loamy and sandy material; on terraces and uplands

This association consists of gently sloping to steep soils on terraces and uplands adjacent to the major rivers and streams. The Thebes soils commonly are higher on the landscape than the Alvin soils. Small depressional areas and ridges are common. Slope generally ranges from 1 to 25 percent.

This association makes up about 2 percent of the county. It is about 45 percent Thebes soils, 35 percent Alvin soils, and 20 percent minor soils (fig. 4).

The Thebes soils are moderately permeable in the upper part and rapidly permeable in the lower part. They formed in silty and loamy material and in the underlying windblown sandy sediments. They are on ridges and side slopes in the uplands and on stream terraces. Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsurface layer is yellowish brown, friable silt loam about 4 inches thick. The subsoil is about 23 inches thick. The upper part is strong brown, friable silt loam. The next part is strong brown, firm clay loam. The lower part is strong brown, friable fine sandy loam. The underlying material to a depth of 60 inches or more is strong brown, loose fine sand that has bands of brown loamy fine sand.

The Alvin soils are moderately permeable or moderately rapidly permeable. They formed in windblown loamy and sandy material. They are on ridges and side slopes in the uplands. Typically, the surface layer is brown, friable fine sandy loam about 7 inches thick. The subsurface layer is yellowish brown, friable sandy loam about 6 inches thick. The subsoil extends to a depth of more than 60 inches. It is friable. The upper part is yellowish brown fine sandy loam. The next part is strong brown sandy loam. The lower part is strong brown loamy sand that has bands of sandy loam.

Of minor extent in this association are the excessively drained Chelsea, somewhat poorly drained Roby, and poorly drained Ruark soils. Chelsea soils are on strongly sloping side slopes below the Alvin soils. Roby and Ruark soils are in low areas below the Alvin and Thebes soils.

Most areas are used for cultivated crops, pasture, or hay. This association is poorly suited, moderately suited, or well suited to cultivated crops. It is well suited to pasture and hay. It is moderately suited or well suited to woodland and well suited to habitat for woodland wildlife. Water erosion, soil blowing, and a limited available water capacity are management concerns.

This association is poorly suited, moderately suited, or well suited to dwellings and septic tank absorption fields. The slope, moderate or rapid permeability, and the shrink-swell potential are limitations that affect these uses.

4. Wakeland-Petrolia Association

Nearly level, somewhat poorly drained and poorly drained, silty soils formed in alluvium; on flood plains

This association consists of soils on flood plains along the major streams and their tributaries. Slope generally ranges from 0 to 2 percent.

This association makes up about 15 percent of the county. It is about 52 percent Wakeland and similar soils, 26 percent Petrolia soils, and 22 percent minor soils.

The Wakeland soils are somewhat poorly drained and are moderately permeable. Areas along the Embarras River that are protected by levees are subject to rare flooding. Other areas are frequently flooded for brief periods from January through May. Typically, the surface layer is brown, mottled, friable silt loam about 9 inches thick. The underlying material to a depth of 60 inches or more is mottled, very friable and friable silt loam. The upper part is grayish brown. The next part is brown. The lower part is grayish brown.

The Petrolia soils are poorly drained and are moderately slowly permeable. Areas along the Embarras River that are protected by levees are subject to rare flooding. Other areas are frequently flooded for long periods from March through June. Typically, the surface layer is dark grayish brown, friable silty clay loam about 8 inches thick. The underlying material to a depth of 60 inches or more is dark gray and gray, mottled, friable silty clay loam.

Of minor extent in this association are the very poorly drained Darwin and well drained Haymond, Hickory, and Landes soils. Darwin soils are in swales and low areas below the major soils. Haymond and Landes soils

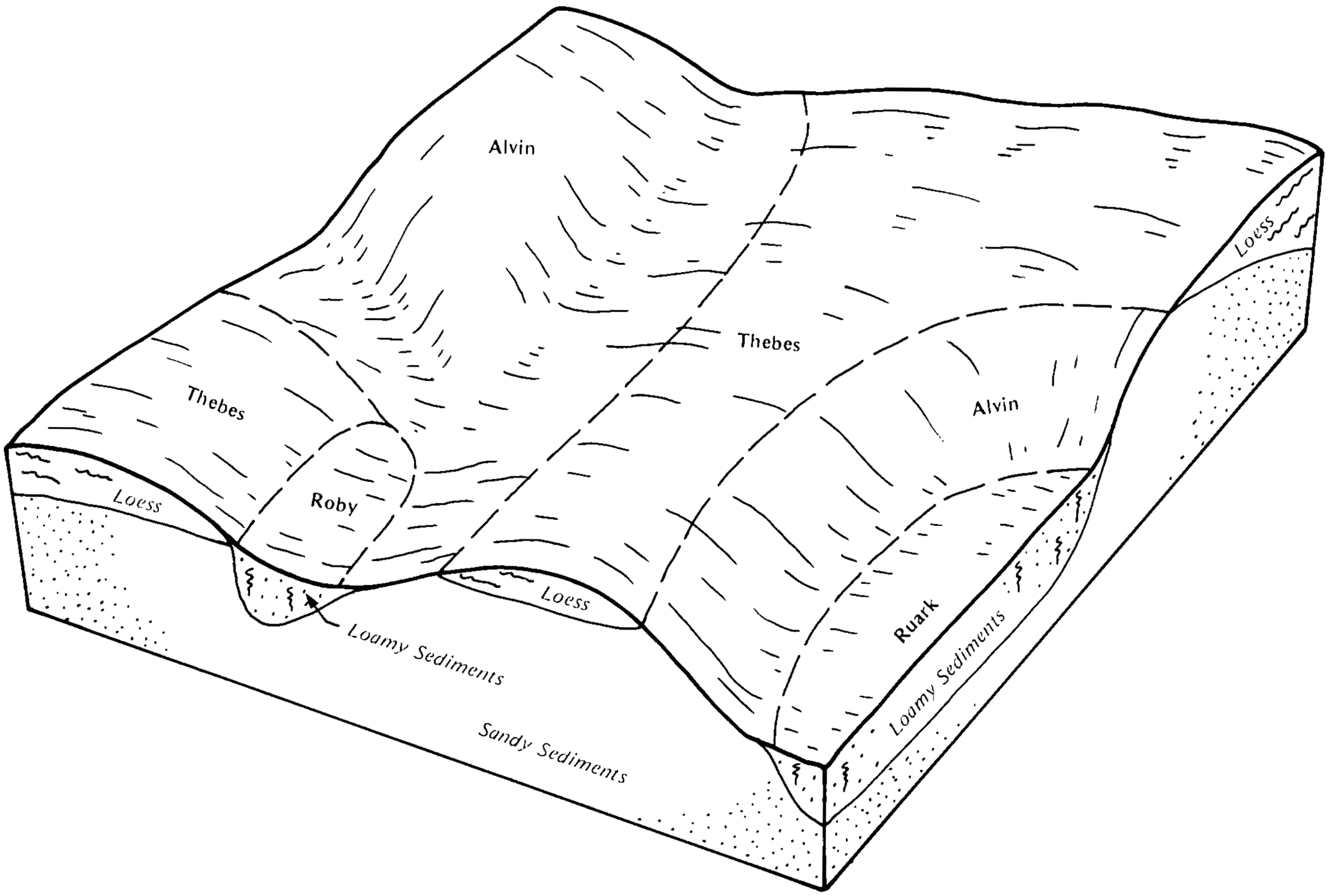


Figure 4.—Typical pattern of soils and parent material in the Thebes-Alvin association.

are on narrow swells and slight rises above the major soils. Hickory soils are on side slopes in the adjacent uplands.

Most areas are used for cultivated crops. Some are used for pasture, hay, or woodland. In protected areas the Wakeland and Petrolia soils are well suited to cultivated crops, pasture, hay, and woodland. In unprotected areas these soils are moderately suited or poorly suited to these uses. The seasonal high water table and the flooding are concerns in managing the soils for cultivated crops, pasture, and hay. This association is moderately suited or well suited to habitat for openland, woodland, and wetland wildlife. Unprotected areas are especially well suited to habitat for wetland wildlife.

This association generally is unsuited to dwellings and septic tank absorption fields because of the hazard of flooding.

Broad Land Use Considerations

William R. Kreznor, soil scientist, Soil Conservation Service, helped prepare this section.

The soils in Jasper County are used mainly for cultivated crops, hay and pasture, or woodland. Other uses include urban and recreational development. About 67 percent of the acreage is used for soybeans, corn, or wheat; about 5 percent for hay and pasture; and about 6 percent for woodland. Only about 2 percent is land in towns, villages, or areas used for industries or highways *(14)*. The suitability of the soils for these uses varies significantly.

Corn, soybeans, and wheat are grown most extensively in areas of associations 1 and 4. These associations generally are moderately suited or well suited to cultivated crops. Wetness is a limitation on the nearly level major soils, such as Cisne, Darmstadt, Petrolia, and Wakeland soils. Also, flooding can delay

Figure 5.—An area of the Cisne-Hoyleton-Darmstadt association, which provides habitat for prairie chickens and other openland wildlife.

planting or damage crops in areas of the Petrolia and Wakeland soils. Erosion is a hazard on the gently sloping soils, such as Darmstadt and Hoyleton soils. It can be controlled by a conservation tillage system, contour farming, and terraces. The Darmstadt soils have a high content of sodium in the subsoil. The sodium reduces yields and increases the susceptibility to erosion.

Much of the hayland and pasture in the county is in areas of associations 2 and 3. The less sloping major soils in these associations, such as Alvin, Atlas, Bluford, Thebes, and Wynoose soils, are suited to hay and pasture.

Most of the woodland in the county is in areas of associations 2, 3, and 4. The Alvin, Thebes, and Wakeland soils in associations 3 and 4 are well suited to woodland. Seasonal wetness increases the seedling mortality rate and the severity of plant competition and limits the use of equipment in areas of the Atlas, Bluford, Petrolia, and Wynoose soils. White oak, red oak, shagbark hickory, black walnut, maple, and elm are the major trees in the uplands. Maple, sycamore, pin oak, and cottonwood are the major trees on flood plains.

Dwellings and septic tank absorption fields are in areas of each of the associations. The soils in association 4 generally are unsuitable as sites for dwellings and septic tank absorption fields because of flooding. Most of the major soils in associations 1 and 2 are poorly suited to urban uses because of the seasonal high water table, the shrink-swell potential, slow or very slow permeability, or the slope. The less sloping areas of the Alvin soils in association 3 are well suited to dwellings and septic tank absorption fields, but the steep areas of these soils are poorly suited. The Thebes soils in this association are well suited to dwellings with basements. They are moderately suited to dwellings without basements because of the shrink-

swell potential. They are poorly suited to septic tank absorption fields because they do not adequately filter the effluent.

The suitability for the development of wildlife habitat is good throughout the county. Association 1 is well suited to openland wildlife habitat (fig. 5). Associations 2 and 3 are well suited to woodland wildlife habitat. Association 4 is moderately suited to openland and wetland wildlife habitat and well suited to woodland wildlife habitat.

Recreational uses include camp and picnic areas, playgrounds, and paths and trails. The associations in the county are well suited, moderately suited, or poorly suited to recreational development. The suitability depends partly on the intensity of the expected use. The major soils in association 4 are poorly suited to many recreational uses because of wetness and flooding. The soils in association 1 and the Bluford and Wynoose soils in association 2 are only moderately suited to recreational development because of slow permeability and wetness. The less sloping areas in association 3 are well suited to recreational development. Excessive slope limits the suitability of the more sloping areas of this association.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Hickory loam, 15 to 30 percent slopes, eroded, is a phase of the Hickory series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Hickory-Gosport complex, 18 to 30 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Urban land is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

The detailed soil maps of Jasper County join with the maps in the soil surveys of Clark, Effingham, and Richland Counties. In some areas the soils in Jasper County join with similar soils that have different names in the adjacent counties. The soils in the adjacent counties were not included in the soil survey of Jasper County because of an insignificant extent or because of conceptual changes in the soil classification system. In some areas the slope gradients do not exactly match because the slope range for the sloping phase is wider in Jasper County than in some of the adjacent counties. The soils that join at the county line are similar and have similar use and management requirements.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

2—Cisne silt loam. This nearly level, poorly drained soil is on broad flats in the uplands. Individual areas are irregular in shape and range from 3 to more than 1,000 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is friable silt loam about 9 inches thick. The upper part is grayish brown and mottled. The lower part is light gray and light brownish gray. The subsoil is mottled silty clay loam about 43 inches thick. The upper

part is gray and light gray and is friable. The next part is grayish brown and firm. The lower part is light brownish gray and firm. The underlying material to a depth of 70 inches or more is dark grayish brown, mottled, firm silt loam. In some areas the surface layer is lighter in color. In other areas it is thicker. In places the subsoil contains less clay.

Included with this soil in mapping are small, closely intermingled areas of Huey soils. These soils have a high content of sodium in the subsoil. They are in landscape positions similar to those of the Cisne soil. Also included are some areas of the somewhat poorly drained Darmstadt and Hoyleton soils on ridges and knolls above the Cisne soil. Darmstadt soils have a high content of sodium in the subsoil. Included soils make up 5 to 15 percent of the unit.

Water and air move through the Cisne soil at a very slow rate. Surface runoff is slow. The seasonal high water table is perched within a depth of 2 feet from February through June in most years. Available water capacity is high. Organic matter content is moderately low. The surface layer is friable and can be easily tilled when moist. The shrink-swell potential is high.

Most areas are used for cultivated crops. Some are used for pasture or hay. This soil is moderately suited to cultivated crops, to pasture, and to hay. It is poorly suited to dwellings and septic tank absorption fields.

Most areas of this soil can be used for soybeans, corn, or small grain because a drainage system has been installed. Measures that maintain the drainage system are needed. Additional drainage measures may be needed in some areas. If suitable outlets are available, surface drains can help to remove excess water. Tilling when the soil is wet causes surface compaction and decreases the rate of water infiltration. Returning crop residue to the soil, adding other organic material, and minimizing tillage increase the infiltration rate and help to maintain good tilth.

Climatically adapted hay and forage species grow well on this soil. Reed canarygrass and alsike clover are suitable. Overgrazing or grazing when the soil is too wet reduces forage yields, causes surface compaction and excessive runoff, and increases the susceptibility to erosion. Proper stocking rates, rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and help to control erosion.

The seasonal high water table and the shrink-swell potential are limitations if this soil is used as a site for dwellings. Reinforcing footings and foundations helps to prevent the structural damage caused by shrinking and swelling. Installing subsurface drains around the footings helps to lower the water table. Elevating the floor of dwellings without basements above the surrounding ground level, grading, and diverting surface water from the site also help to overcome the wetness.

The seasonal wetness and the very slow permeability are limitations if this soil is used as a site for septic tank absorption fields. The septic tank system can function satisfactorily only if a sealed sand filter or an aerobic treatment system is installed. Sewage lagoons function very well on this soil.

The land capability classification is IIIw.

3B—Hoyleton silt loam, 1 to 3 percent slopes. This very gently sloping, somewhat poorly drained soil is on broad ridges and on knolls in the uplands. Individual areas are irregular in shape and range from 3 to 300 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is brown, friable silt loam about 7 inches thick. The subsoil extends to a depth of more than 60 inches. It is mottled and firm. The upper part is brown and yellowish brown silty clay loam. The lower part is yellowish brown silt loam. In some areas the surface soil is lighter in color. In places the slope is more than 3 percent.

Included with this soil in mapping are small, closely intermingled areas of Darmstadt soils. These soils have a high content of sodium in the subsoil. Also included are areas of the poorly drained Cisne and Huey soils on the lower flats. Huey soils have a high content of sodium in the subsoil. Included soils make up 10 to 15 percent of the unit.

Water and air move through the Hoyleton soil at a slow rate. Surface runoff is slow. The seasonal high water table is at a depth of 1 to 3 feet from March through June in most years. Available water capacity is high. Organic matter content is moderately low. The surface layer is friable and can be easily tilled when moist. The shrink-swell potential is high.

Most areas are used for cultivated crops. Some are used for pasture or hay. This soil is well suited to cultivated crops, to pasture, and to hay. It is poorly suited to dwellings and septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, erosion is a hazard and the wetness delays planting in some years. A system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion. A water management system is necessary to control and remove excess surface water. Surface ditches, grassed waterways, or a combination of these can function satisfactorily if suitable outlets are available. Tilling when the soil is wet causes surface compaction and reduces the rate of water infiltration. Returning crop residue to the soil and regularly adding

other organic material increase the infiltration rate and improve tilth.

Climatically adapted hay and forage species grow well on this soil. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Subsurface tile drains can help to lower the seasonal high water table if suitable outlets are available. Overgrazing or grazing when the soil is too wet reduces forage yields, causes surface compaction and excessive runoff, and increases the susceptibility to erosion. Proper stocking rates, rotation grazing, timely deferment of grazing, and applications of fertilizer keep the pasture in good condition.

If this soil is used as a site for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface tile drains near the foundations helps to overcome the wetness. Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

The seasonal high water table and the slow permeability are limitations if this soil is used as a site for septic tank absorption fields. The septic tank system can function satisfactorily only if a sealed sand filter and a disinfection tank or an evapotranspiration bed are installed. Sewage lagoons function satisfactorily if the site is leveled.

The land capability classification is IIe.

3B2—Hoyleton silt loam, 2 to 5 percent slopes, eroded. This gently sloping, somewhat poorly drained soil is on knolls and ridges and on side slopes along drainageways in the uplands. Individual areas are irregular in shape and range from 3 to 60 acres in size.

Typically, the surface layer is mixed very dark grayish brown and grayish brown silt loam about 7 inches thick. It has been thinned by erosion. The subsoil is mottled, firm silty clay loam about 41 inches thick. The upper part is yellowish brown and brown. The next part is light brownish gray. The lower part is light brownish gray and has a high content of sand. The underlying material to a depth of 60 inches or more is light gray, firm clay loam. In some severely eroded areas, the surface layer is silty clay loam. In some places the subsoil contains less clay. In other places the surface layer is lighter in color.

Included with this soil in mapping are small, closely intermingled areas of Darmstadt soils. These soils have a high content of sodium in the subsoil. They make up 5 to 10 percent of the unit.

Water and air move through the Hoyleton soil at a slow rate. Surface runoff is medium. The seasonal high water table is 1 to 3 feet below the surface from March through June in most years. Available water capacity is high. Organic matter content is low. The surface layer is friable and can be easily tilled when moist. It tends to crust and puddle after hard rains, however, because it generally contains material from the subsoil. The shrink-swell potential is high.

Most areas are used for cultivated crops, pasture, or hay. This soil is well suited to cultivated crops, to pasture, and to hay. It is poorly suited to dwellings and septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, further erosion is a hazard unless the surface is protected. Also, the wetness delays planting in some years. A drainage system is needed in some areas. Erosion can be controlled by a system of conservation tillage that leaves crop residue on the surface after planting and by contour farming or terraces. Tilling when the soil is wet causes surface compaction, cloddiness, and excessive runoff and erosion. Returning crop residue to the soil and regularly adding other organic material increase the rate of water infiltration and improve tilth.

Climatically adapted hay and forage species grow well on this soil. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Subsurface tile drains can help to lower the seasonal high water table if suitable outlets are available. Overgrazing or grazing when the soil is too wet reduces forage yields, causes surface compaction and excessive runoff, and increases the susceptibility to erosion. Proper stocking rates, rotation grazing, timely deferment of grazing, and applications of fertilizer keep the pasture in good condition.

If this soil is used as a site for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface tile drains near the foundations helps to overcome the wetness. Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

The seasonal high water table and the slow permeability are limitations if this soil is used as a site for septic tank absorption fields. The septic tank system can function satisfactorily only if a sealed sand filter and a disinfection tank or an evapotranspiration bed are installed. Sewage lagoons function satisfactorily if the site is leveled.

The land capability classification is IIe.

4B—Richview silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on convex ridgetops and the crest of knolls in the uplands. Individual areas are round or oval and range from 3 to 20 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is brown, friable silt loam about 4

inches thick. The subsoil is about 34 inches thick. It is yellowish brown, mottled, and firm. The upper part is silty clay loam. The lower part is silt loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, firm silt loam. In some areas the surface layer is lighter in color. In places the lower part of the subsoil and the underlying material are redder and contain more sand.

Included with this soil in mapping are small areas of the poorly drained, very slowly permeable Cisne soils. These soils are on broad flats below the Richview soil. They make up less than 10 percent of the unit.

Water and air move through the Richview soil at a moderate rate. Surface runoff is medium in cultivated areas. The seasonal high water table is 4 to 6 feet below the surface from February through May in most years. Available water capacity is high. Organic matter content is moderately low. The surface layer is friable and can be easily tilled when moist. The shrink-swell potential is moderate.

Most areas are used for cultivated crops. Some are used for pasture or hay. This soil is well suited to cultivated crops, to pasture, and to hay. It is moderately suited to dwellings and septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, erosion is a hazard unless the surface is protected. Erosion can be controlled by a system of conservation tillage that leaves crop residue on the surface after planting and by contour farming or terraces. Tilling when the soil is wet causes surface compaction, decreases the rate of water infiltration, and causes excessive runoff and erosion. Returning crop residue to the soil and regularly adding other organic material help to maintain tilth and fertility.

A cover of grasses and legumes improves tilth and helps to control erosion. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Proper stocking rates, rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition.

If this soil is used as a site for dwellings with basements, the seasonal high water table and the shrink-swell potential are limitations. The shrink-swell potential also is a limitation on sites for dwellings without basements. Installing subsurface tile drains near the foundations helps to overcome the wetness. Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table and the moderate permeability are limitations. Installing subsurface tile drains helps to lower the water table. Increasing the size of the absorption field or replacing the soil with more permeable material helps to overcome the moderate permeability.

The land capability classification is IIe.

4C2—Richview silt loam, 5 to 10 percent slopes, eroded. This sloping, moderately well drained soil is on the sides of ridges and along drainageways in the uplands. Individual areas are oval or long and narrow and range from 3 to 20 acres in size.

Typically, the surface layer is dark brown, friable silt loam about 7 inches thick. It has been thinned by erosion. The subsoil is about 37 inches thick. The upper part is yellowish brown, friable silt loam. The next part is yellowish brown and light brownish gray, mottled, firm silty clay loam. The lower part is grayish brown, mottled, firm clay loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, firm clay loam. In some areas the surface layer is lighter in color. In other areas the subsoil is clay loam throughout. In severely eroded areas the surface layer is silty clay loam. In places the lower part of the subsoil and the underlying material are redder and contain more sand.

Included with this soil in mapping are the somewhat poorly drained, very slowly permeable Darmstadt soils and the very slowly permeable Tamalco soils. These soils have a high content of sodium in the subsoil. Darmstadt soils are on side slopes below the Richview soil. Tamalco soils are in landscape positions similar to those of the Richview soil. Included soils make up 5 to 15 percent of the unit.

Water and air move through the Richview soil at a moderate rate. Surface runoff is medium. The seasonal high water table is 4 to 6 feet below the surface from February through May in most years. Available water capacity is high. Organic matter content is low. The surface layer is friable and can be easily tilled when moist. It tends to crust and puddle, however, after hard rains. The shrink-swell potential is moderate.

Most areas are used for cultivated crops, pasture, or hay. This soil is moderately suited to cultivated crops. It is well suited to pasture and hay. It is moderately suited to dwellings and septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, further erosion is a hazard unless the surface is protected. Erosion can be controlled by a system of conservation tillage that leaves crop residue on the surface after planting, by contour farming, and by a crop rotation that includes 1 or more years of forage crops. Tilling when the soil is wet causes cloddiness, surface compaction, and excessive runoff and erosion. Returning crop residue to the soil and regularly adding other organic material increase the rate of water infiltration and help to maintain tilth.

A cover of grasses and legumes improves tilth and helps to control erosion. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Proper stocking rates, rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition.

If this soil is used as a site for dwellings with basements, the seasonal high water table and the shrink-swell potential are limitations. Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling. Installing subsurface tile drains near the foundations lowers the water table.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table and the moderate permeability are limitations. Installing subsurface tile drains helps to lower the water table. Increasing the size of the absorption field or replacing the soil with more permeable material helps to overcome the moderate permeability.

The land capability classification is IIIe.

7C2—Atlas silt loam, 5 to 10 percent slopes, eroded. This sloping, somewhat poorly drained soil is on side slopes along drainageways in the uplands. Individual areas are long and narrow or irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. It has been thinned by erosion. The subsoil extends to a depth of more than 60 inches. It is mottled. The upper part is dark yellowish brown, firm silty clay loam. The next part is grayish brown, very firm silty clay. The lower part is light gray, firm clay loam. In some severely eroded areas, the surface layer is silty clay loam. In places the slope is less than 5 percent. In some areas the lower part of the subsoil contains less clay. In other areas the subsoil contains less sand.

Included with this soil in mapping are the well drained Hickory and poorly drained Wynoose soils. Hickory soils are on the steeper side slopes below the Atlas soil. Wynoose soils are on broad flats above the Atlas soil. Included soils make up 5 to 20 percent of the unit.

Water and air move through the Atlas soil at a very slow rate. Surface runoff is rapid. The seasonal high water table is perched at a depth of 1 to 2 feet from April through June in most years. Available water capacity is high. Organic matter content is moderately low. This soil is seepy in many spots, and it commonly dries more slowly in the spring than the adjacent soils. The shrink-swell potential is high.

Most areas are used for cultivated crops. Some are used for pasture or hay. This soil is moderately suited to cultivated crops and woodland. It is well suited to pasture and hay. It is poorly suited to dwellings and septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, further erosion is a hazard unless the surface is protected. Erosion can be controlled by a combination of no-till planting or another kind of conservation tillage, contour farming, and a crop rotation that includes 1 or more years of forage crops. Tilling when the soil is wet causes cloddiness, surface compaction, and excessive runoff and erosion. Returning crop residue to the soil and regularly adding other organic material increase the rate of water infiltration and help to maintain tilth.

A cover of grasses and legumes improves tilth and helps to control erosion. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Proper stocking rates, rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition.

If this soil is used as woodland, seedling mortality and windthrow are management concerns. They are caused by the high content of clay. Selecting mature planting stock reduces the seedling mortality rate. Some replanting may be necessary. Using harvest methods that do not isolate the remaining trees or leave them widely spaced and removing only high-value trees from a strip 50 feet wide along the west and south edges of the woodland reduce the hazard of windthrow. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

If this soil is used as a site for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface tile drains near the foundations helps to overcome the wetness. Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

The seasonal high water table and the very slow permeability are limitations if this soil is used as a site for septic tank absorption fields. The septic tank system can function satisfactorily only if a sealed sand filter or an aerobic treatment plant is installed. Sewage lagoons function satisfactorily if the site is leveled.

The land capability classification is IIIe.

7C3—Atlas silty clay loam, 5 to 10 percent slopes, severely eroded. This sloping, somewhat poorly drained soil is on side slopes along drainageways in the uplands. In most areas, nearly all of the original surface soil has been removed by erosion and tillage has mixed the rest with the upper part of the subsoil. Individual

areas are irregular in shape and range from 3 to 50 acres in size.

Typically, the surface layer is yellowish brown, firm silty clay loam about 5 inches thick. The subsoil extends to a depth of more than 60 inches. It is mottled. The upper part is brown, firm silty clay loam. The next part is grayish brown, very firm silty clay. The lower part is grayish brown, very firm clay loam. In some less eroded areas, the surface layer is silt loam. In places the subsoil contains more sand.

Included with this soil in mapping are small areas of the well drained Hickory soils. These soils are on the steeper side slopes below the Atlas soil. Also included are small areas of the poorly drained Wynoose soils on broad flats above the Atlas soil. Included soils make up 10 to 20 percent of the unit.

Water and air move through the Atlas soil at a very slow rate. Surface runoff is rapid. The seasonal high water table is perched 1 to 2 feet below the surface from April through June in most years. Available water capacity is moderate. Organic matter content is low. The surface layer is firm when moist, sticky when wet, and hard and cloddy when dry. This soil cannot be tilled so easily as the less eroded adjacent soils. Also, it is seepy in many spots and dries more slowly in the spring than the adjacent soils. It tends to be droughty late in the growing season. The shrink-swell potential is high.

Most areas are used for cultivated crops, hay, or pasture. This soil is poorly suited to cultivated crops. It is well suited to pasture and hay. It is moderately suited to woodland. It is poorly suited to dwellings and septic tank absorption fields.

Measures that control erosion are needed in the areas used for soybeans, corn, or small grain. Examples are a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, and a crop rotation that includes 1 or more years of forage crops. Tilling when the soil is wet causes surface compaction, decreases the rate of water infiltration, and causes excessive runoff and erosion. Returning crop residue to the soil and regularly adding other organic material increase the infiltration rate and improve tilth.

Establishing pasture plants or hay on this soil helps to control erosion. Although yields are low, bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, rotation grazing, and deferred grazing when the soil is wet help to keep the pasture in good condition. Preparing a good seedbed is difficult because of surface crusting and the tendency of the soil to be cloddy.

If this soil is used as woodland, seedling mortality and windthrow are management concerns. They are caused by the high content of clay. Selecting mature planting stock reduces the seedling mortality rate. Some replanting may be necessary. Using harvest methods that do not isolate the remaining trees or leave them widely spaced and removing only high-value trees from a strip 50 feet wide along the west and south edges of the woodland reduce the hazard of windthrow. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

If this soil is used as a site for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface tile drains near the foundations helps to overcome the wetness. Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

The seasonal high water table and the very slow permeability are limitations if this soil is used as a site for septic tank absorption fields. The septic tank system can function satisfactorily only if a sealed sand filter or an aerobic treatment plant is installed. Sewage lagoons function satisfactorily if the site is leveled.

The land capability classification is IVe.

7D2—Atlas silt loam, 10 to 15 percent slopes, eroded. This strongly sloping, somewhat poorly drained soil is on side slopes along drainageways in the uplands. Individual areas are long and narrow or irregular in shape and range from 5 to 60 acres in size.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. It has been thinned by erosion. The subsoil extends to a depth of more than 60 inches. It is mottled. The upper part is yellowish brown, firm silty clay loam. The next part is light brownish gray, very firm silty clay. The lower part is gray, very firm clay loam. In places the slope is less than 10 percent. In some areas the subsoil contains less clay. In other areas it is browner.

Included with this soil in mapping are small areas of the moderately well drained Gosport soils and the somewhat poorly drained Wakeland soils. Gosport soils are moderately deep over bedrock and are in steep and very steep areas below the Atlas soil. Wakeland soils are on flood plains and in drainageways below the Atlas soil. Included soils make up 5 to 10 percent of the unit.

Water and air move through the Atlas soil at a very slow rate. Surface runoff is rapid. Available water

capacity is high. The seasonal high water table is perched at a depth of 1 to 2 feet from April through June in most years. Organic matter content is moderately low. The shrink-swell potential is high.

Most areas are used for pasture. Some are used for cultivated crops or woodland. This soil is poorly suited to cultivated crops. It is well suited to pasture and hay. It is moderately suited to woodland. It is poorly suited to dwellings and to septic tank absorption fields.

Measures that control erosion are needed in the areas used for corn, soybeans, or small grain. Examples are no-till planting or another kind or conservation tillage, contour farming, and a crop rotation that includes 1 or more years of forage crops. Tilling when the soil is wet causes cloddiness, surface compaction, and excessive runoff and erosion. Returning crop residue to the soil and regularly adding other organic material increase the rate of water infiltration and improve tilth.

A cover of grasses and legumes improves tilth and helps to control erosion. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Proper stocking rates, rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition.

If this soil is used as woodland, seedling mortality and windthrow are management concerns. They are caused by the high content of clay. Selecting mature planting stock reduces the seedling mortality rate. Some replanting may be necessary. Using harvest methods that do not isolate the remaining trees or leave them widely spaced and removing only high-value trees from a strip 50 feet wide along the west and south edges of the woodland reduce the hazard of windthrow. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

The shrink-swell potential, the seasonal high water table, and the slope are limitations if this soil is used as a site for dwellings. Reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling. Underground drains help to lower the water table. Cutting and filling help to overcome the slope.

The seasonal high water table, the very slow permeability, and the slope are limitations if this soil is used as a site for septic tank absorption fields. Subsurface tile drains that are installed higher on the side slope than the absorption field help to intercept seepage and overcome the wetness. Leveling the site and installing a specially designed sand filter system help to overcome the slope and the very slow permeability.

The land capability classification is IVe.

7D3—Atlas silty clay loam, 10 to 15 percent slopes, severely eroded. This strongly sloping, somewhat poorly drained soil is on side slopes along drainageways in the uplands. In most areas, nearly all of the original surface soil has been removed by erosion and tillage has mixed the rest with the upper part of the subsoil. Individual areas are long and narrow and range from 3 to 30 acres in size.

Typically, the surface layer is mixed yellowish brown and brown, firm silty clay loam about 6 inches thick. The subsoil extends to a depth of more than 60 inches. It is mottled and very firm. The upper part is gray silty clay loam. The next part is dark gray silty clay. The lower part is gray silty clay. In some areas the surface layer is clay loam. In other areas the subsoil contains less clay. In some places the upper part of the subsoil is browner. In other places the slope is less than 10 percent or more than 15 percent.

Included with this soil in mapping are small areas of Gosport and Wakeland soils. The moderately well drained Gosport soils are moderately deep over bedrock and are on steep and very steep side slopes below the Atlas soil. The somewhat poorly drained Wakeland soils are on flood plains and in drainageways below the Atlas soil. Included soils make up 5 to 10 percent of the unit.

Water and air move through the Atlas soil at a very slow rate. Surface runoff is rapid. The seasonal high water table is perched at a depth of 1 to 2 feet from April through June in most years. Available water capacity is moderate. Organic matter content is low. The surface layer is firm when moist, sticky when wet, and hard and cloddy when dry. The shrink-swell potential is high.

Most areas are used for cultivated crops, pasture, or hay. A few areas are wooded. This soil generally is unsuited to cultivated crops because of a severe hazard of erosion. It is moderately suited to pasture and hay. It is well suited to woodland and to woodland wildlife habitat. It is poorly suited to dwellings and septic tank absorption fields.

Establishing pasture plants or hay on this soil helps to control erosion. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, rotation grazing, and deferred grazing when the soil is wet help to keep the pasture in good condition. Preparing a good seedbed is difficult because of surface crusting and the tendency of the soil to become cloddy. A no-till method of pasture

renovation and seeding on the contour help to prevent further erosion.

If this soil is used as woodland, seedling mortality and windthrow are management concerns. They are caused by the high content of clay. Selecting mature planting stock reduces the seedling mortality rate. Some replanting may be necessary. Using harvest methods that do not isolate the remaining trees or leave them widely spaced and removing only high-value trees from a strip 50 feet wide along the west and south edges of the woodland reduce the hazard of windthrow. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

The wooded areas of this soil provide good habitat for woodland wildlife. Measures that exclude livestock help to prevent depletion of the shrubs and sprouts that provide food and cover for woodland wildlife, such as deer, squirrels, and a variety of songbirds. Hedges and rows of shrubs provide cover for doves and other birds.

The shrink-swell potential, the seasonal high water table, and the slope are limitations if this soil is used as a site for dwellings. Reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling. Underground drains help to lower the water table. Cutting and filling help to overcome the slope.

The seasonal high water table, the very slow permeability, and the slope are limitations if this soil is used as a site for septic tank absorption fields. Subsurface tile drains that are installed higher on the side slope than the absorption field help to intercept seepage and overcome the wetness. Leveling the site and installing a specially designed sand filter system help to overcome the slope and the very slow permeability.

The land capability classification is VIe.

8F—Hickory loam, 15 to 30 percent slopes. This steep, well drained soil is on side slopes along drainageways in the uplands. Individual areas are long and narrow or irregular in shape and range from 5 to 150 acres in size.

Typically, the surface layer is very dark grayish brown, friable loam about 3 inches thick. The subsurface layer is brown, friable loam about 5 inches thick. The subsoil is about 39 inches thick. It is yellowish brown. The upper part is friable loam. The lower part is mottled, firm clay loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, calcareous, friable clay loam. In some areas the slope is more than 30 percent or less than 15 percent. In some places the subsoil contains more sand. In other places it formed in shale residuum. In some severely eroded areas, the surface layer is clay loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Wakeland soils. These soils are on flood plains below the Hickory soil. They make up less than 10 percent of the unit.

Water and air move through the Hickory soil at a moderate rate. Surface runoff is rapid. Available water capacity is high. Organic matter content is moderately low. The shrink-swell potential is moderate in the subsoil.

Most areas are used as woodland. This soil is well suited to woodland and to habitat for woodland wildlife. It is moderately suited to pasture and hay. It generally is unsuited to cultivated crops and to dwellings and septic tank absorption fields because of the slope.

Erosion control is needed when grasses and legumes are established in pastured areas. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. In areas where the pasture is established, interseeding legumes on the contour with a no-till seeder improves forage quality. A permanent cover of pasture plants helps to control erosion and maintain tilth. Proper stocking rates, rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition.

In the areas used as woodland, the slope causes an erosion hazard and limits the use of equipment. Plant competition hinders the growth of desirable seedlings. Erosion can be controlled by building logging roads and skid trails on or nearly on the contour, by skidding logs or trees uphill with a cable and winch on the steeper slopes, by establishing grass firebreaks, and by seeding bare areas to grass or to a grass-legume mixture after logging activities have been completed. The use of machinery is limited to periods when the soil is firm. The competition from undesirable plants in openings created by timber harvesting can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees and damage to tree roots. Measures that protect the woodland from fire are needed.

The wooded areas of this soil provide good habitat for woodland wildlife. Measures that exclude livestock help to prevent depletion of the shrubs and sprouts that provide food and cover for woodland wildlife, such as deer, squirrels, and a variety of songbirds and raptors.

The land capability classification is VIe.

8F2—Hickory loam, 15 to 30 percent slopes, eroded. This steep, well drained soil is on side slopes along drainageways in the uplands. Individual areas are

long and narrow or irregular in shape and range from 5 to 150 acres in size.

Typically, the surface layer is mixed pale brown and dark yellowish brown, friable loam about 3 inches thick. It has been thinned by erosion. The subsoil is about 45 inches thick. It is yellowish brown and firm. The upper part is clay loam. The lower part is loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, firm, calcareous loam. In some areas the slope is more than 30 percent or less than 15 percent. In places the subsoil formed in shale residuum. In some severely eroded areas, the surface layer is clay loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Atlas and Wakeland soils. Atlas soils are on side slopes above the Hickory soil. Wakeland soils are on flood plains below the Hickory soil. Included soils make up less than 10 percent of the unit.

Water and air move through the Hickory soil at a moderate rate. Surface runoff is rapid. Available water capacity is high. Organic matter content is low. The shrink-swell potential is moderate in the subsoil.

Most areas are used as pasture. This soil is well suited to woodland and to habitat for woodland wildlife. It is moderately suited to pasture and hay. It generally is unsuited to cultivated crops and to dwellings and septic tank absorption fields because of the slope.

Erosion control is needed when grasses and legumes are established in pastured areas. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. In areas where the pasture is established, interseeding legumes on the contour with a no-till seeder improves forage quality. A permanent cover of pasture plants helps to control erosion and maintain tilth. Proper stocking rates, rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition.

In the areas used as woodland, the slope causes an erosion hazard and limits the use of equipment. Plant competition hinders the growth of desirable seedlings. Erosion can be controlled by building logging roads and skid trails on or nearly on the contour, by skidding logs or trees uphill with a cable and winch on the steeper slopes, by establishing grass firebreaks, and by seeding bare areas to grass or to a grass-legume mixture after logging activities have been completed. The use of machinery is limited to periods when the soil is firm. The competition from undesirable plants in openings created by timber harvesting can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

The land capability classification is VIe.

8G—Hickory loam, 30 to 60 percent slopes. This very steep, well drained soil is on side slopes along drainageways in the uplands. Individual areas are long and narrow or irregular in shape and range from 5 to 50 acres in size.

Typically, the surface layer is very dark grayish brown loam about 3 inches thick. The subsurface layer is brown, friable loam about 5 inches thick. The subsoil is about 43 inches thick. It is yellowish brown and firm. The upper part is clay loam. The lower part is loam. The underlying material to a depth of 60 inches or more is light yellowish brown, mottled, firm loam. In some areas the slope is more than 60 percent or less than 30 percent. In places the subsoil formed in shale residuum. In some eroded areas the surface layer is clay loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Wakeland soils. These soils are on flood plains below the Hickory soil. They make up less than 10 percent of the unit.

Water and air move through the Hickory soil at a moderate rate. Surface runoff is rapid. Available water capacity is high. Organic matter content is moderately low. The shrink-swell potential is moderate in the subsoil.

Most areas are used as woodland. This soil is moderately suited to woodland and well suited to habitat for woodland wildlife. It is poorly suited to pasture and hay. It generally is unsuited to cultivated crops and to dwellings and septic tank absorption fields because of the slope.

In the areas used as woodland, the slope causes an erosion hazard and limits the use of equipment. Plant competition hinders the growth of desirable seedlings. Erosion can be controlled by building logging roads and skid trails on or nearly on the contour, by skidding logs or trees uphill with a cable and winch on the steeper slopes, by establishing grass firebreaks, and by seeding bare areas to grass or to a grass-legume mixture after logging activities have been completed. The use of machinery is limited to periods when the soil is firm. The competition from undesirable plants in openings created by timber harvesting can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

The wooded areas of this soil provide good habitat for woodland wildlife. Measures that exclude livestock help to prevent depletion of the shrubs and sprouts that provide food and cover for woodland wildlife, such as

deer, squirrels, and a variety of songbirds and raptors.

The land capability classification is VIIe.

12—Wynoose silt loam. This nearly level, poorly drained soil is on broad flats in the uplands. Individual areas are oval or irregular in shape and range from 3 to 500 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 7 inches thick. The subsurface layer is light brownish gray, mottled, friable silt loam about 10 inches thick. The subsoil is about 29 inches thick. It is mottled and firm. The upper part is grayish brown and light brownish gray silty clay. The lower part is light brownish gray silty clay loam. The underlying material to a depth of 60 inches or more is gray, mottled, firm silt loam. In some areas the surface layer is darker. In other areas, the subsurface layer is thicker and the subsoil contains less clay. In some places the upper part of the subsoil contains less clay and is browner. In other places the surface layer, the subsurface layer, and the upper part of the subsoil contain more sand.

Included with this soil in mapping are small areas of the somewhat poorly drained Atlas soils. These soils are on side slopes below the Wynoose soil. Also included are small areas of the moderately well drained Ava soils on convex ridgetops and side slopes above the Wynoose soil. Included soils make up less than 15 percent of the unit.

Water and air move through the Wynoose soil at a very slow rate. Surface runoff is slow. The seasonal high water table is perched within a depth of 2 feet from March through June in most years. Available water capacity is high. Organic matter content is low. The surface layer is friable and can be easily tilled when moist. It tends to crust or puddle, however, after hard rains. The shrink-swell potential is high.

Most areas are used for cultivated crops, pasture, or hay. Some are used as woodland. This soil is moderately suited to cultivated crops, to pasture, and to hay. It is poorly suited to woodland and to dwellings and septic tank absorption fields.

A drainage system is needed in the areas used for corn, soybeans, or small grain. One has been installed in most areas. Installing scattered surface drains, leveling the land, and using a combination of shallow ditches and drainage outlets reduce the wetness. Tilling when the soil is wet causes surface compaction and decreases the rate of water infiltration. Minimizing tillage and returning crop residue to the soil increase the infiltration rate and help to maintain good tilth.

Climatically adapted hay and forage species grow well on this soil. Reed canarygrass and alsike clover are suitable. Overgrazing or grazing when the soil is too wet reduces forage yields, causes surface compaction and excessive runoff, and increases the susceptibility to erosion. Proper stocking rates, rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and help to control erosion.

In the areas used as woodland, the seasonal high water table limits the use of equipment and causes seedling mortality and a windthrow hazard. Plant competition is a management concern. The use of equipment is limited to periods when the soil is firm. Planting mature nursery stock on prepared ridges reduces the seedling mortality rate. Using a harvest method that does not isolate the remaining trees or leave them widely spaced and removing only high-value trees from a strip 50 feet wide along the west and south edges of the woodland reduce the hazard of windthrow. The competition from undesirable plants in openings created by timber harvesting can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

The seasonal high water table and the shrink-swell potential are limitations if this soil is used as a site for dwellings. Reinforcing footings and foundations helps to prevent the structural damage caused by shrinking and swelling. Installing subsurface drains around the footings helps to lower the water table. Elevating the floor of dwellings without basements above the surrounding ground level, grading, and diverting surface water from the site also help to overcome the wetness.

The seasonal high water table and the very slow permeability are limitations if this soil is used as a site for septic tank absorption fields. The septic tank system can function satisfactorily only if a sealed sand filter or an aerobic treatment plant is installed.

The land capability classification is IIIw.

13A—Bluford silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on broad ridges and on knolls in the uplands. Individual areas are irregular in shape and range from 3 to 300 acres in size.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsurface layer is brown and pale brown, mottled, friable silt loam about 7 inches thick. The subsoil is mottled silty clay loam about 39 inches thick. The upper part is pale brown and firm. The next part is light brownish gray and firm. The lower part is light brownish gray and is firm and slightly brittle. The underlying material to a depth of 60 inches or more is grayish brown, mottled, firm silt loam. In some areas

the subsoil is grayer. In other areas the surface layer is darker. In some small areas the slope is more than 2 percent.

Included with this soil in mapping are small areas of Darmstadt soils. These soils have a high content of sodium in the subsoil. They are in landscape positions similar to those of the Bluford soil. They make up 5 to 10 percent of the unit.

Water and air move through the Bluford soil at a moderately slow or slow rate. Surface runoff is slow. The seasonal high water table is perched at a depth of 1 to 3 feet from March through June in most years. Available water capacity is high. Organic matter content is moderately low. The surface layer is friable and can be easily tilled when moist. It tends to crust and puddle, however, after hard rains. The shrink-swell potential is moderate.

Most areas are used for cultivated crops. Some are used for pasture or hay. This soil is well suited to cultivated crops, pasture, hay, and woodland (fig. 6). It is poorly suited to dwellings and septic tank absorption fields.

Most areas of this soil can be used for soybeans, corn, or small grain because a drainage system has been installed. The wetness delays planting in some years. A water management system is needed to control and remove excess surface water. Surface ditches, grassed waterways, or a combination of these can function satisfactorily if suitable outlets are available. Tilling when the soil is wet causes surface compaction, reduces the rate of water infiltration, and causes excessive runoff. Returning crop residue to the soil and regularly adding other organic material increase the infiltration rate and improve tilth.

Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable forage species on this soil. In the areas used as pasture, overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction, excessive runoff, and poor tilth. Installing subsurface tile drains helps to overcome the wetness. Proper stocking rates, rotation grazing, and deferred grazing when the soil is wet help to keep the pasture in good condition.

Measures that protect wooded areas of this soil from fire and from grazing by livestock are needed. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots.

If this soil is used as a site for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface tile drains near the foundations helps to overcome the wetness. Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

The seasonal high water table and the slow or moderately slow permeability are limitations if this soil is used as a site for septic tank absorption fields. The septic tank system can function satisfactorily only if a sealed sand filter or an aerobic treatment plant is installed. Sewage lagoons function very well on this soil.

The land capability classification is IIw.

13B2—Bluford silt loam, 2 to 5 percent slopes, eroded. This gently sloping, somewhat poorly drained soil is on side slopes along drainageways in the uplands. Individual areas are irregular in shape and range from 3 to 90 acres in size.

Typically, the surface layer is mixed brown and yellowish brown, friable silt loam about 7 inches thick. It has been thinned by erosion. The subsoil extends to a depth of more than 60 inches. It is mottled. The upper part is yellowish brown, firm silty clay loam. The next part is light brownish gray, firm and slightly brittle silty clay loam. The lower part is light brownish gray, very firm and extremely firm clay loam. In severely eroded areas the surface layer is silty clay loam. In some areas the slope is more than 5 percent. In other areas the subsoil contains less clay throughout.

Included with this soil in mapping are small areas of Darmstadt soils. These soils have a high content of sodium in the subsoil. They are in landscape positions similar to those of the Bluford soil. They make up 5 to 15 percent of the unit.

Water and air move through the Bluford soil at a moderately slow or slow rate. Surface runoff is medium. The seasonal high water table is perched at a depth of 1 to 3 feet from March through June in most years. Available water capacity is high. Organic matter content is low. The surface layer tends to crust and puddle after hard rains because it generally contains firm material from the subsoil. The shrink-swell potential is moderate.

Most areas are used for cultivated crops. Some are used for pasture or hay. This soil is well suited to cultivated crops, pasture, hay, and woodland. It is poorly suited to dwellings and septic tank absorption fields.

Most areas of this soil can be used for corn, soybeans, or small grain because a drainage system has been installed. The wetness delays planting in some years. It can be reduced by a combination of surface ditches and drainage outlets. Further erosion is a hazard. It can be controlled by a system of conservation tillage that leaves crop residue on the surface after planting, by contour farming, and by terraces. Tilling when the soil is wet causes surface cloddiness and compaction and excessive runoff and

Figure 6.—Hay on Bluford silt loam, 0 to 2 percent slopes. This soil is well suited to pasture and hay.

erosion. Returning crop residue to the soil and regularly adding other organic material increase the rate of water infiltration and improve tilth.

Climatically adapted hay and forage species grow well on this soil. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Subsurface tile drains can help to lower the seasonal high water table if suitable outlets are available. Overgrazing or grazing when the soil is too wet reduces forage yields, causes surface compaction and excessive runoff, and increases the susceptibility to erosion. Proper stocking rates, rotation grazing, timely deferment of grazing, and applications of fertilizer keep the pasture in good condition.

If this soil is used as a site for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface tile drains near the foundations helps to overcome the wetness. Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

The seasonal high water table and the slow or moderately slow permeability are limitations if this soil is used as a site for septic tank absorption fields. The septic tank system can function satisfactorily only if a sealed sand filter or an aerobic treatment plant is installed. Sewage lagoons function satisfactorily if the site is leveled.

The land capability classification is IIe.

14B—Ava silt loam, 1 to 5 percent slopes. This gently sloping, moderately well drained soil is on the crest of narrow ridges in the uplands. Individual areas are irregular in shape and range from 3 to 80 acres in size.

Typically, the surface layer is dark brown, friable silt loam about 5 inches thick. The subsurface layer is

yellowish brown, friable silt loam about 4 inches thick. The subsoil extends to a depth of more than 60 inches. The upper part is yellowish brown, firm silty clay loam. The next part is yellowish brown and strong brown, mottled, firm silty clay loam. The lower part is yellowish brown, mottled, firm and brittle silt loam. In some eroded areas the surface layer is mixed with the upper part of the subsoil. In some places the slope is more than 5 percent. In other places the lower part of the subsoil is not so brittle.

Included with this soil in mapping are small areas of the poorly drained Wynoose soils. These soils are on broad flats above the Ava soil. They make up less than 10 percent of the unit.

Water and air move through the upper part of the Ava soil at a moderate rate, through the next part at a moderately slow rate, and through the lower part at a very slow rate. Surface runoff is medium. The seasonal high water table is perched at a depth of 1.5 to 3.5 feet from March through June in most years. Available water capacity is high. Organic matter content is moderately low. The surface layer is friable and can be easily tilled when moist. The shrink-swell potential is moderate.

Most areas are used for cultivated crops. Some are used for pasture, hay, or woodland. This soil is well suited to cultivated crops, pasture, hay, and woodland. It is moderately suited to dwellings without basements. It is poorly suited to dwellings with basements and to septic tank absorption fields.

Measures that control erosion are needed in the areas used for soybeans, corn, or small grain. Examples are a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, and terraces. Tilling when the soil is wet causes surface cloddiness and compaction and excessive runoff and erosion. Returning crop residue to the soil and regularly adding other organic material help to maintain tilth and fertility.

A cover of grasses and legumes improves tilth and helps to control erosion. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Proper stocking rates, rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition.

If this soil is used as woodland, plant competition is a management concern. It hinders the growth of desirable seedlings. The competition in openings where timber has been harvested can be controlled by chemical or mechanical means. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

The seasonal high water table and the shrink-swell potential are limitations if this soil is used as a site for dwellings. The wetness is a more severe limitation on sites for dwellings with basements than on sites for dwellings without basements. Reinforcing footings and foundations helps to prevent the structural damage caused by shrinking and swelling. Installing subsurface drains around the foundations lowers the water table.

The seasonal wetness and the very slow permeability are limitations if this soil is used as a site for septic tank absorption fields. The septic tank system can function satisfactorily only if a sealed sand filter or an aerobic treatment plant is installed.

The land capability classification is IIe.

14C2—Ava silt loam, 5 to 10 percent slopes, eroded. This sloping, moderately well drained soil is on side slopes along drainageways and on the sides of ridges in the uplands. Individual areas are long and narrow or irregular in shape and range from 3 to 85 acres in size.

Typically, the surface layer is mixed brown and yellowish brown, friable silt loam about 7 inches thick. It has been thinned by erosion. The subsoil extends to a depth of more than 60 inches. The upper part is yellowish brown and pale brown, firm silty clay loam and silt loam. The next part is yellowish brown, very firm and brittle silty clay loam. The lower part is yellowish brown, very firm and brittle clay loam and loam. In some areas the lower part of the subsoil is not brittle. In other areas the slope is more than 10 percent. In places the subsoil contains more sand and gravel. In severely eroded areas the surface layer is silty clay loam.

Included with this soil in mapping are small areas of the well drained, moderately permeable Hickory soils. These soils are on the steeper slopes below the Ava soil. Also included are some areas of the poorly drained Wynoose soils on broad flats above the Ava soil. Included soils make up 10 to 20 percent of the unit.

Water and air move through the upper part of the Ava soil at a moderate rate, through the next part at a moderately slow rate, and through the lower part at a very slow rate. Surface runoff is medium. The seasonal high water table is perched at a depth of 1.5 to 3.5 feet from March through June in most years. Available water capacity is moderate. Organic matter content is low. The surface layer is friable. It tends to crust or puddle, however, after hard rains, especially in cultivated areas where it contains material from the subsoil. The shrink-swell potential is moderate.

Most areas are used for cultivated crops. Some are used for pasture, hay, or woodland. This soil is moderately suited to cultivated crops. It is well suited to pasture, hay, and woodland. It is moderately suited to

dwellings without basements and poorly suited to dwellings with basements and to septic tank absorption fields.

Measures that control erosion are needed in the areas used for soybeans, corn, or small grain. Examples are a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, terraces, and a crop rotation that includes 1 or more years of forage crops. Tilling when the soil is wet causes surface cloddiness and compaction and excessive runoff and erosion. Returning crop residue to the soil and regularly adding other organic material increase the rate of water infiltration and help to maintain tilth.

A cover of grasses and legumes improves tilth and helps to control erosion. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Proper stocking rates, rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition.

If this soil is used as woodland, plant competition is a management concern. It hinders the growth of desirable seedlings. The competition in openings where timber has been harvested can be controlled by chemical or mechanical means. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

The seasonal high water table and the shrink-swell potential are limitations if this soil is used as a site for dwellings. The wetness is a more severe limitation on sites for dwellings with basements than on sites for dwellings without basements. Reinforcing footings and foundations helps to prevent the structural damage caused by shrinking and swelling. Installing subsurface drains around the foundations lowers the water table.

The seasonal high water table and the very slow permeability are limitations if this soil is used as a site for septic tank absorption fields. The septic tank system can function satisfactorily only if a sealed sand filter or an aerobic treatment plant is installed.

The land capability classification is IIIe.

48—Ebbert silt loam. This nearly level, very poorly drained soil is in depressions in the uplands. It is ponded for brief periods from April through July. Individual areas are oval or irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is very dark gray, friable silt loam about 7 inches thick. The subsurface layer is friable silt loam about 11 inches thick. The upper part is very dark gray. The lower part is grayish brown and mottled. The subsoil is mottled, firm silty clay loam about 34 inches thick. The upper part is dark gray. The lower part is grayish brown. The underlying material to a depth of 60 inches or more is grayish brown, mottled, firm silty clay loam. In some areas the upper part of the subsurface layer is not so dark. In other areas the subsoil contains more clay.

Included with this soil in mapping are small areas of the somewhat poorly drained Hoyleton soils. These soils are on knolls and ridges above the Ebbert soil and are not subject to ponding. They make up less than 10 percent of the unit.

Water and air move through the Ebbert soil at a slow rate. Surface runoff is slow to ponded. The seasonal high water table is 0.5 foot above the surface to 2.0 feet below from April through July in most years. Available water capacity is high. Organic matter content is moderate. The surface layer is friable and can be easily tilled when moist. The shrink-swell potential is moderate.

Most areas are used for cultivated crops. Some are used for pasture or hay. This soil is well suited to cultivated crops. It is moderately suited to pasture and hay. It generally is unsuited to dwellings and septic tank absorption fields because of the ponding.

Most areas of this soil can be used for soybeans, corn, or small grain because a drainage system has been installed. In some years the wetness delays planting, restricts other fieldwork, and reduces productivity (fig. 7). Measures that maintain and improve the drainage system are needed. Surface ditches and subsurface drains can function satisfactorily if suitable outlets are available. Tilling when the soil is wet causes surface cloddiness and compaction. Returning crop residue to the soil and regularly adding other organic material increase the rate of water infiltration and improve tilth.

Reed canarygrass and alsike clover are suitable forage species on this soil. In the areas used for pasture or hay, the ponding is a hazard. It can be controlled by surface drains, ditches, and surface inlet tile. Deferment of grazing when the soil is too wet helps to prevent surface compaction and deterioration of tilth. Proper stocking rates, rotation grazing, and applications of fertilizer help to keep the pasture in good condition.

The land capability classification is IIw.

109—Racoon silt loam. This nearly level, poorly drained soil is in depressions or at the head of drainageways in the uplands and on foot slopes and low stream terraces. It is subject to ponding from March through June and is occasionally flooded for brief periods from March through May. Individual areas are oval or irregular in shape and range from 3 to 60 acres in size.

Figure 7.—A cultivated area of Ebbert silt loam. The wetness reduces productivity, delays planting, and restricts other fieldwork.

Typically, the surface layer is grayish brown, very friable silt loam about 6 inches thick. The subsurface layer is light brownish gray, mottled, very friable silt loam about 21 inches thick. The subsoil to a depth of more than 60 inches is mottled, firm silty clay loam. The upper part is light brownish gray. The lower part is grayish brown. In some areas the subsoil contains more clay. In other areas it contains more sand. In places the surface layer is darker.

Included with this soil in mapping are small areas of the somewhat poorly drained Atlas soils. These soils are in sloping areas along drainageways below the Racoon soil. They make up 5 to 10 percent of the unit.

Water and air move through the Racoon soil at a slow rate. Surface runoff is slow to ponded. The seasonal high water table is 0.5 foot above the surface to 2.0 feet below from March through June in most years. Available water capacity is high. Organic matter content is moderately low. The surface layer is very friable and can be easily tilled when moist. The shrink-swell potential is high in the subsoil.

Most areas are used for cultivated crops, pasture, or hay. Some are used as woodland. This soil is moderately suited to cultivated crops, pasture, hay, and woodland. It generally is unsuited to dwellings and septic tank absorption fields because of the ponding and the hazard of flooding.

Most areas of this soil can be used for corn, soybeans, or small grain because a drainage system has been installed. Measures that maintain the drainage system are needed. A combination of surface ditches or subsurface drains and drainage outlets helps to remove

excess water. The wetness or flooding delays planting in some years. The flooding, however, does not occur during the growing season in most years. Installing flood-protection measures, carefully timing fieldwork, and selecting suitable varieties for planting help to overcome the hazard of flooding and the wetness. Tilling when the soil is wet causes surface compaction and cloddiness. Returning crop residue to the soil and regularly adding other organic material increase the rate of water infiltration and improve tilth.

Reed canarygrass and alsike clover are suitable forage species on this soil. In the areas used for pasture or hay, the ponding is a hazard. It can be controlled by surface drains, ditches, and surface inlet tile. Deferment of grazing when the soil is too wet helps to prevent surface compaction and deterioration of tilth. Proper stocking rates, rotation grazing, and applications of fertilizer help to keep the pasture in good condition.

In the areas used as woodland, the seasonal high water table limits the use of equipment and causes seedling mortality and a windthrow hazard. Plant competition is a management concern. The use of equipment is limited to periods when the soil is firm. Planting mature nursery stock on prepared ridges reduces the seedling mortality rate. Using a harvest method that does not isolate the remaining trees or leave them widely spaced and removing only high-value trees from a strip 50 feet wide along the west and south edges of the woodland reduce the hazard of windthrow. The competition from undesirable plants in openings created by timber harvesting can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

The land capability classification is IIIw.

120—Huey silt loam. This nearly level, poorly drained soil is on broad flats in the uplands. It is ponded for brief periods from March through June. It has a high content of sodium in the subsoil. Individual areas are irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is light brownish gray, mottled, friable silt loam about 6 inches thick. The subsoil to a depth of more than 60 inches is mottled, firm silty clay loam. The upper part is grayish brown and gray. The lower part is light gray. In some areas the surface layer is darker. In other areas the subsoil contains more clay. In some places the soil is deeper to a high content of sodium. In other places the upper part of the subsoil has a higher proportion of brown colors.

Included with this soil in mapping are small, closely intermingled areas of Cisne soils. These soils have a lower content of sodium in the subsoil than the Huey soil and have a darker surface layer. They are in landscape positions similar to those of the Huey soil. They make up 5 to 10 percent of the unit.

Water and air move through the Huey soil at a very slow rate. Surface runoff is slow to ponded. The seasonal high water table is perched 0.5 foot above the surface to 2.0 feet below from March through June in most years. Available water capacity is moderate. Organic matter content is moderately low. The surface layer is friable, but it tends to crust and puddle after hard rains. The shrink-swell potential is moderate.

Most areas are used for cultivated crops. Some are used for hay or pasture. This soil is poorly suited to cultivated crops, hay, and pasture. It generally is unsuited to dwellings and septic tank absorption fields because of the ponding.

A drainage system is needed in the areas used for soybeans, corn, or small grain. One has been installed in most places. In most years the wetness delays planting. Surface ditches can remove excess water if suitable outlets are available. Measures that maintain the drainage system are needed. The high content of sodium in the subsoil results in moisture stress during dry periods and excess moisture during wet periods. Also, it restricts the availability and uptake of some plant nutrients. Tilling when the soil is wet causes surface compaction and cloddiness and decreases the rate of water infiltration. Minimizing tillage, returning crop residue to the soil, and adding other organic material increase the infiltration rate and improve tilth and fertility. Applying lime in areas where the surface soil is medium acid or strongly acid improves fertility.

Canarygrass, alsike clover, and ladino clover are suitable forage species on this soil. In the areas used for pasture or hay, the seasonal high water table and the ponding are limitations. A combination of shallow ditches and subsurface inlet tile is needed to remove excess water. Overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction and poor tilth. Proper stocking rates, rotation grazing, and deferred grazing when the soil is wet help keep the pasture in good condition.

The land capability classification is IVw.

131B—Alvin fine sandy loam, 1 to 5 percent slopes. This gently sloping, well drained soil is on ridges in the uplands. Individual areas are irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is brown, friable fine sandy loam about 7 inches thick. The subsurface layer is yellowish brown, friable sandy loam about 6 inches thick. The subsoil extends to a depth of more than 60 inches. The upper part is yellowish brown, friable fine sandy loam. The next part is strong brown, friable sandy loam. The lower part is strong brown, friable loamy sand that has bands of sandy loam. In some areas the upper part of the soil contains less sand and more clay. In other areas, the lower part of the subsoil is mottled and the seasonal high water table is within a depth of 6 feet. In places the subsoil contains less clay.

Included with this soil in mapping are small areas of the excessively drained Chelsea soils. These soils are in landscape positions similar to those of the Alvin soil. They have a rapidly permeable subsoil. Also included are small areas of the poorly drained, nearly level Ruark soils. Included soils make up 15 to 20 percent of the unit.

Water and air move through the Alvin soil at a moderate or moderately rapid rate. Surface runoff is slow. Available water capacity is moderate. Organic matter content is low. The surface layer is friable and can be easily tilled when moist.

Most areas are used for cultivated crops. Some are used for pasture or hay. This soil is well suited to cultivated crops, pasture, hay, and woodland. It also is well suited to dwellings and septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, erosion and soil blowing are hazards. Also, the moderate available water capacity and the level of fertility are limitations. Erosion can be controlled and moisture conserved by a conservation tillage system that leaves crop residue on the surface after planting, by contour farming, or by terraces. Field windbreaks and a tillage system that leaves the surface rough are effective in controlling soil blowing.

Climatically adapted hay and forage species grow well on this soil. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Overgrazing increases the susceptibility to erosion and soil blowing. As a result, timely deferment of grazing is needed. The plants should not be grazed until they are sufficiently established. Applications of fertilizer are needed.

The land capability classification is IIe.

131C2—Alvin fine sandy loam, 5 to 12 percent slopes, eroded. This sloping, well drained soil is on side slopes and ridges in the uplands. Individual areas are irregular in shape and range from 3 to 20 acres in size.

Typically, the surface layer is mixed brown and yellowish brown, friable fine sandy loam about 7 inches thick. It has been thinned by erosion. The subsoil extends to a depth of more than 60 inches. The upper part is yellowish brown, friable fine sandy loam. The next part is strong brown, friable fine sandy loam. The lower part is yellowish brown and strong brown, very friable loamy sand that has thin bands of brown and dark brown sandy loam. In some areas the upper part of the subsoil contains more clay and less sand. In other areas, the lower part of the subsoil is mottled and the seasonal high water table is within a depth of 6 feet. In some small areas the slope is less than 5 percent or more than 12 percent. In places the subsoil contains more sand.

Included with this soil in mapping are small areas of the excessively drained, rapidly permeable Chelsea soils. These soils are on ridges. Also included are small areas of the poorly drained Ruark and somewhat poorly drained Roby soils. These soils are in nearly level areas below the Alvin soil. Included soils make up 10 to 25 percent of the unit.

Water and air move through the Alvin soil at a moderate or moderately rapid rate. Surface runoff is medium. Available water capacity is moderate. Organic matter content is low. The surface layer is friable and easily tilled when moist.

Most areas are used for cultivated crops, pasture, or hay. This soil is moderately suited to cultivated crops and to dwellings and septic tank absorption fields. It is well suited to pasture, hay, and woodland.

If this soil is used for corn, soybeans, or small grain, erosion and soil blowing are hazards. Also, the moderate available water capacity and the level of fertility are limitations. Erosion can be controlled and moisture conserved by a conservation tillage system that leaves crop residue on the surface after planting, by contour farming, and by terraces. Field windbreaks and a tillage system that leaves the surface rough help to control soil blowing. Returning crop residue to the soil and regularly adding other organic material help to maintain productivity, prevent crusting, and improve tilth.

Climatically adapted hay and forage species grow well on this soil. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Overgrazing increases the susceptibility to erosion and soil blowing. As a result, timely deferment of grazing is needed. The plants should not be grazed or clipped until they are sufficiently established. Seeding the pasture on the contour helps to control erosion.

If this soil is used as woodland, plant competition is a management concern. It hinders the growth of desirable seedlings. The competition in openings where timber has been harvested can be controlled by chemical or mechanical means. Excluding livestock from the

woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

If this soil is used as a site for dwellings or septic tank absorption fields, the slope is a limitation. Cutting and filling help to overcome this limitation on sites for dwellings. Installing the filter lines on the contour helps to overcome this limitation on sites for septic tank absorption fields.

The land capability classification is IIIe.

131E2—Alvin fine sandy loam, 12 to 25 percent slopes, eroded. This steep, well drained soil is on side slopes along drainageways in the uplands. Individual areas are long and narrow and range from 5 to 20 acres in size.

Typically, the surface layer is mixed brown and strong brown, friable fine sandy loam about 5 inches thick. It has been thinned by erosion. The subsoil extends to a depth of more than 60 inches. The upper part is strong brown, very friable sandy loam. The lower part is strong brown and yellowish brown, very friable sandy loam that has bands of loamy sand. In some areas the upper part of the subsoil contains more clay and less sand. In other areas the subsoil contains less clay. In some small areas the slope is more than 25 percent.

Included with this soil in mapping are areas of the excessively drained, rapidly permeable Chelsea soils. These soils contain less clay than the Alvin soil. They are in landscape positions similar to those of the Alvin soil or are in the less sloping areas. They make up less than 10 percent of the unit.

Water and air move through the Alvin soil at a moderate or moderately rapid rate. Surface runoff is medium. Available water capacity is moderate. Organic matter content is low. The shrink-swell potential also is low.

Most areas are used for pasture or hay. Some are used as cropland or woodland. This soil is well suited to pasture and hay. It is moderately suited to woodland. It is poorly suited to cultivated crops and to dwellings and septic tank absorption fields.

Unless the surface is protected, further water erosion and soil blowing are hazards in the areas used for corn, soybeans, or small grain. Also, the moderate available water capacity is a limitation. Field windbreaks, a system of conservation tillage that leaves crop residue on the surface, and a crop rotation that includes 1 or more years of forage crops help to control water erosion and soil blowing and prevent the crop damage caused by windblown soil particles. Returning crop residue to the soil and regularly adding other organic material increase the rate of water infiltration, conserve moisture, maintain tilth, and improve fertility.

Climatically adapted hay and forage species grow well on this soil. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Overgrazing increases the susceptibility to erosion and soil blowing. As a result, timely deferment of grazing is needed. The plants should not be grazed or clipped until they are sufficiently established. Seeding the pasture on the contour helps to control erosion.

In the areas used as woodland, the slope causes an erosion hazard and limits the use of equipment. Plant competition hinders the growth of desirable seedlings. Erosion can be controlled by building logging roads and skid trails on or nearly on the contour, by skidding logs or trees uphill with a cable and winch, by establishing grass firebreaks, and by seeding bare areas to grass or to a grass-legume mixture after logging activities have been completed. The use of machinery is limited to periods when the soil is firm. The competition from undesirable plants in openings created by timber harvesting can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

If this soil is used as a site for dwellings or septic tank absorption fields, the slope is a limitation. Cutting and filling help to overcome this limitation on sites for dwellings. Installing the filter lines on the contour helps to overcome this limitation on sites for septic tank absorption fields.

The land capability classification is IVe.

138—Shiloh silty clay loam. This nearly level, very poorly drained soil is in depressions on broad flats in the uplands. It is ponded for brief periods from March through June. Individual areas are oval or irregular in shape and range from 3 to 80 acres in size.

Typically, the surface layer is very dark gray, firm silty clay loam about 8 inches thick. The subsurface layer is very dark gray, mottled, firm silty clay loam about 8 inches thick. The subsoil is about 43 inches thick. It is mottled and firm. The upper part is very dark gray silty clay. The next part is dark gray silty clay. The lower part is dark gray silty clay loam. The underlying material to a depth of 65 inches or more is gray, mottled, firm silty clay loam. In some areas the surface layer is silt loam. In other areas the subsoil contains less clay. In places the surface soil is not so thick.

Included with this soil in mapping are small areas of the poorly drained Cisne and Newberry soils. These soils are near the edges of the depressions and are not

subject to ponding. They make up 10 to 20 percent of the unit.

Water and air move through the Shiloh soil at a moderately slow rate. Surface runoff is slow to ponded. The seasonal high water table is 1 foot above the surface to 2 feet below from March through June in most years. Available water capacity is high. Organic matter content also is high. The surface layer is firm when moist and sticky when wet. This soil cannot be tilled so easily as the adjacent soils. The shrink-swell potential is high.

Most areas are used for cultivated crops. Some are used for pasture or hay. This soil is well suited to cultivated crops, to pasture, and to hay. It generally is unsuited to dwellings and septic tank absorption fields because of the ponding.

Most areas of this soil can be used for corn, soybeans, or small grain because a drainage system has been installed. In most years the wetness delays planting, restricts other fieldwork, and reduces productivity. Measures that maintain the drainage system are needed. Additional drainage measures are needed in some areas. Surface ditches and random subsurface drains can function satisfactorily if suitable drainage outlets are available. Tilling when the soil is wet causes surface cloddiness and compaction. Returning crop residue to the soil and regularly adding other organic material increase the rate of water infiltration and improve tilth.

Reed canarygrass and alsike clover are suitable forage species on this soil. In the areas used for pasture or hay, the ponding is a hazard. It can be controlled by surface drains, ditches, and surface inlet tile. Deferment of grazing when the soil is too wet helps to prevent surface compaction and deterioration of tilth. Proper stocking rates, rotation grazing, and applications of fertilizer help to keep the pasture in good condition.

The land capability classification is IIw.

178—Ruark fine sandy loam. This nearly level, poorly drained soil is on broad flats and in depressions in the uplands and on low stream terraces adjacent to bluffs in the major stream valleys. It is ponded for brief periods in early spring. Individual areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is dark grayish brown, very friable fine sandy loam about 7 inches thick. The subsurface layer is light brownish gray, mottled, very friable fine sandy loam about 6 inches thick. The subsoil is about 33 inches thick. It is light brownish gray and mottled. The upper part is friable loam. The lower part is firm clay loam that has a few thin strata of loam. The underlying material to a depth of 60 inches or more is grayish brown, mottled, friable sandy loam that has common thin strata of sandy clay loam. In some areas the underlying material contains more clay and less sand. In other areas the surface soil is darker. In places the soil is more acid throughout.

Included with this soil in mapping are small areas of the well drained Alvin and somewhat poorly drained Roby soils. These soils contain less clay in the subsoil than the Ruark soil. Alvin soils are on ridges and side slopes above the Ruark soil. Roby soils are slightly higher on the landscape than the Ruark soil. Included soils make up 10 to 20 percent of the unit.

Water and air move through the Ruark soil at a moderately slow rate. Surface runoff is slow to ponded. The seasonal high water table is 0.5 foot above the surface to 2.0 feet below in spring. Available water capacity is high. Organic matter content is low. The surface layer is very friable and can be easily tilled when moist.

Most areas are used for cultivated crops. Some are used for pasture or hay. This soil is moderately suited to cultivated crops, pasture, hay, and woodland. It generally is unsuited to dwellings and septic tank absorption fields because of the ponding.

Most areas of this soil can be used for corn, soybeans, or small grain because a drainage system has been installed. In most years the wetness delays planting. Measures that maintain the drainage system are needed. Surface ditches and tile drains can function satisfactorily if suitable outlets are available. Soil blowing is a hazard. Field windbreaks and a system of conservation tillage that leaves crop residue on the surface after planting help to prevent excessive soil blowing. Returning crop residue to the soil helps to maintain tilth and fertility.

Reed canarygrass and alsike clover are suitable forage species on this soil. In the areas used for pasture or hay, the ponding is a hazard. It can be controlled by surface drains, ditches, and surface inlet tile. Deferment of grazing when the soil is too wet helps to prevent surface compaction and deterioration of tilth. Proper stocking rates, rotation grazing, and applications of fertilizer help to keep the pasture in good condition.

If this soil is used as woodland, the seasonal high water table limits the use of equipment. Seedling mortality and plant competition also are management concerns. The use of equipment is limited to periods when the soil is firm. Planting mature nursery stock on prepared ridges reduces the seedling mortality rate. Some replanting may be necessary. The competition from undesirable plants in openings created by timber harvesting can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and

damage to tree roots. Measures that protect the woodland from fire are needed.

The land capability classification is IIIw.

184—Roby fine sandy loam. This nearly level, somewhat poorly drained soil is on toe slopes in the uplands and on low stream terraces at the base of bluffs. Individual areas are irregular in shape and range from 3 to 80 acres in size.

Typically, the surface layer is dark grayish brown, very friable fine sandy loam about 9 inches thick. The subsurface layer is yellowish brown, very friable loamy fine sand about 6 inches thick. The subsoil is about 31 inches thick. It is yellowish brown, mottled, and very friable. The upper part is fine sandy loam. The lower part is loamy sand. The underlying material to a depth of 60 inches or more is light brownish gray, mottled, loose sand. In some places the upper part of the soil contains less sand and more clay. In other places the subsurface layer and the upper part of the subsoil have a higher proportion of gray colors. In some areas depth to the seasonal high water table is more than 3 feet.

Included with this soil in mapping are small areas of the poorly drained Ruark and Wynoose soils. These soils are in shallow depressions and on broad flats below the Roby soil. They make up about 10 to 20 percent of the unit.

Water and air move through the upper part of the Roby soil at a moderate rate and through the lower part at a moderately rapid or rapid rate. Surface runoff is slow. The seasonal high water table is 1 to 3 feet below the surface from March through June in most years. Available water capacity is moderate. Organic matter content is moderately low.

Most areas are used for cultivated crops. Some are used for pasture or hay. This soil is well suited to cultivated crops, hay, pasture, and woodland. It is poorly suited to dwellings and septic absorption fields.

In the areas used for corn, soybeans, or small grain, soil blowing is a hazard and the moderate available water capacity is a limitation. Field windbreaks and a cover of crop residue help to control soil blowing and prevent the crop damage caused by windblown soil particles. Returning crop residue to the soil helps to maintain tilth, conserves moisture, and improves fertility.

Climatically adapted hay and forage species grow well on this soil. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Overgrazing increases the susceptibility to erosion and soil blowing. As a result, timely deferment of grazing is needed. The plants should not be grazed until they are sufficiently established. Applications of fertilizer are needed.

If this soil is used as woodland, plant competition is a management concern. It hinders the growth of desirable seedlings. The competition in openings where timber has been harvested can be controlled by chemical or mechanical means. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

If this soil is used as a site for dwellings, the seasonal high water table is a limitation. It can be lowered, however, by subsurface drains around the foundations. Installing a drainage system also helps to establish lawns and ornamental trees and shrubs.

If this soil is used as a site for septic tank absorption fields, a poor filtering capacity is a limitation. The soil readily absorbs but does not adequately filter the effluent from septic tanks. The poor filtering capacity can result in the pollution of ground water. Filling or mounding with suitable material increases the filtering capacity of the field.

The land capability classification is IIs.

212B—Thebes silt loam, 1 to 5 percent slopes. This gently sloping, well drained soil is on ridges and side slopes in the uplands and on stream terraces. Individual areas are irregular in shape and range from 5 to 120 acres in size.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsurface layer is yellowish brown, friable silt loam about 4 inches thick. The subsoil is about 23 inches thick. The upper part is strong brown, friable silt loam. The next part is strong brown, firm clay loam. The lower part is strong brown, friable fine sandy loam. The underlying material to a depth of 60 inches or more is strong brown, loose fine sand that has bands of brown loamy fine sand. In some places the upper part of the soil contains more sand. In other places, the lower part of the subsoil is mottled and the seasonal high water table is within a depth of 6 feet. In some areas the lower part of the subsoil contains less sand. In other areas the slope is more than 5 percent.

Included with this soil in mapping are small areas of the somewhat poorly drained Roby and poorly drained Ruark soils. These soils are in shallow depressions and on broad flats below areas of the Thebes soil in the uplands. They make up 5 to 15 percent of the unit.

Water and air move through the upper part of the Thebes soil at a moderate rate and through the lower part at a rapid rate. Surface runoff is medium. Available water capacity is moderate. Organic matter content is moderately low. The surface layer is friable and can be easily tilled when moist. The shrink-swell potential is moderate.

Most areas are used for cultivated crops. Some are used for pasture or hay. This soil is well suited to

cultivated crops, pasture, hay, woodland, and dwellings with basements. It is moderately well suited to dwellings without basements. It is poorly suited to septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, erosion is a hazard. Also, the moderate available water capacity is a limitation. Erosion can be controlled by a system of conservation tillage that leaves crop residue on the surface after planting, by contour farming, and by terraces. Tilling when the soil is wet causes surface compaction, decreases the rate of water infiltration, and causes excessive runoff and erosion. Returning crop residue to the soil and regularly adding other organic material conserve moisture and help to maintain tilth and fertility.

The moderate available water capacity is a limitation if this soil is used for pasture or hay. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Overgrazing reduces forage yields, causes surface compaction and excessive runoff, and increases the susceptibility to erosion. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition.

If this soil is used as woodland, plant competition is a management concern. It hinders the growth of desirable seedlings. The competition in openings where timber has been harvested can be controlled by chemical or mechanical means. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

The shrink-swell potential is a limitation if this soil is used as a site for dwellings without basements. Reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

If this soil is used as a site for septic tank absorption fields, a poor filtering capacity is a limitation. The soil readily absorbs but does not adequately filter the effluent from septic tanks. The poor filtering capacity can result in the pollution of ground water. Filling or mounding with suitable material increases the filtering capacity of the field.

The land capability classification is IIe.

212C2—Thebes silt loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on the sides of ridges in the uplands and on stream terraces. Individual areas are irregular in shape and range from 3 to 20 acres in size.

Typically, the surface layer is mixed brown and yellowish brown, friable silt loam about 6 inches thick. It has been thinned by erosion. The subsoil is about 31 inches thick. It is strong brown. The upper part is firm silty clay loam. The lower part is friable sandy clay loam. The underlying material to a depth of 60 inches or more is yellowish brown, very friable loamy sand that has bands of strong brown sandy loam. In some places the surface layer and the upper part of the subsoil contain more sand. In other places, the lower part of the subsoil is mottled and the seasonal high water table is within a depth of 6 feet. In a few areas the slope is less than 5 percent or more than 10 percent.

Included with this soil in mapping are small areas of the excessively drained Chelsea soils. These soils are in landscape positions similar to those of the Thebes soil. They make up less than 10 percent of the unit.

Water and air move through the upper part of the Thebes soil at a moderate rate and through the lower part at a rapid rate. Surface runoff is medium. Available water capacity is moderate. Organic matter content is low. The surface layer is friable and can be easily tilled when moist. It tends to crust and puddle, however, after hard rains. The shrink-swell potential is moderate.

Most areas are used for cultivated crops, pasture, or hay. This soil is well suited to pasture, hay, woodland, and dwellings with basements. It is moderately suited to cultivated crops and dwellings without basements. It is poorly suited to septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, erosion is a hazard. Also, the moderate available water capacity is a limitation. A combination of conservation tillage, contour farming, and a crop rotation that includes 1 or more years of forage crops helps to control erosion. Tilling when the soil is wet causes surface cloddiness and compaction, decreases the rate of water infiltration, and causes excessive runoff and erosion. Returning crop residue to the soil and regularly adding other organic material increase the rate of water infiltration, conserve moisture, and help to maintain tilth.

If this soil is used for pasture or hay, the moderate available water capacity is a limitation and further erosion is a hazard. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Overgrazing reduces forage yields, causes surface compaction and excessive runoff, and increases the susceptibility to erosion. Proper stocking rates, rotation grazing, timely deferment of grazing, and applications of fertilizer help to control erosion and keep the pasture in good condition.

If this soil is used as woodland, plant competition is a management concern. It hinders the growth of desirable seedlings. The competition in openings where timber has been harvested can be controlled by chemical or mechanical means. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the

woodland from fire are needed.

The shrink-swell potential is a limitation if this soil is used as a site for dwellings without basements. Reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

If this soil is used as a site for septic tank absorption fields, a poor filtering capacity is a limitation. The soil readily absorbs but does not adequately filter the effluent from septic tanks. The poor filtering capacity can result in the pollution of ground water. Filling or mounding with suitable material increases the filtering capacity of the field.

The land capability classification is IIIe.

218—Newberry silt loam. This nearly level, poorly drained soil is on broad flats in the uplands. Individual areas are oval or irregular in shape and range from 3 to 300 acres in size.

Typically, the surface layer is very dark grayish brown, very friable silt loam about 8 inches thick. The subsurface layer is dark grayish brown, mottled, friable silt loam about 6 inches thick. The subsoil is mottled, firm silty clay loam about 41 inches thick. The upper part is grayish brown. The lower part is gray. The underlying material to a depth of 60 inches or more is gray, mottled, firm silty clay loam. In some areas the dark surface layer is more than 10 inches thick. In other areas the subsoil contains more clay.

Included with this soil in mapping are small areas of the somewhat poorly drained Hoyleton and very poorly drained Shiloh soils. These soils contain more clay in the subsoil than the Newberry soil. Hoyleton soils are on ridges above the Newberry soil. Shiloh soils are in depressions below the Newberry soil. Included soils make up 5 to 15 percent of the unit.

Water and air move through the Newberry soil at a slow rate. Surface runoff is slow. The seasonal high water table is within a depth of 2 feet from March through June in most years. Available water capacity is high. Organic matter content is moderate. The surface layer is friable and can be easily tilled when moist. The shrink-swell potential is moderate.

Most areas are used for cultivated crops. Some are used for pasture or hay. This soil is well suited to cultivated crops, to pasture, and to hay. It is poorly suited to septic tank absorption fields.

Most areas of this soil can be used for soybeans, corn, or small grain because a drainage system has been installed. Measures that maintain the drainage system are needed. Additional drainage measures are needed in some areas. A combination of surface drains and closely spaced subsurface drains helps to lower the water table. Tilling when the soil is wet causes surface cloddiness and compaction and decreases the rate of water infiltration. Returning crop residue to the soil, regularly adding other organic material, and minimizing tillage increase the infiltration rate and help to maintain good tilth.

Climatically adapted hay and forage species grow well on this soil. Reed canarygrass and alsike clover are suitable. Overgrazing or grazing when the soil is too wet reduces forage yields, causes surface compaction and excessive runoff, and increases the susceptibility to erosion. Proper stocking rates, rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and help to control erosion.

If this soil is used as a site for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface tile drains near the foundations helps to overcome the wetness. Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

The seasonal high water table and the slow permeability are limitations if this soil is used as a site for septic tank absorption fields. The septic tank system can function satisfactorily only if a sealed sand filter or an aerobic treatment plant is installed. Sewage lagoons function well on this soil.

The land capability classification is IIw.

424—Shoals silt loam. This nearly level, somewhat poorly drained soil is on flood plains. It is frequently flooded for brief periods from October through June. Individual areas are long and narrow and range from 10 to 200 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsurface layer is brown, mottled, friable silt loam about 4 inches thick. The underlying material to a depth of 60 inches or more is brown and light brownish gray, mottled, friable, stratified silt loam, sandy loam, and loam. In some areas the surface layer contains more clay. In other areas it is darker. In some places the underlying material contains less sand. In other places the seasonal high water table is at the surface.

Included with this soil in mapping are small areas of the well drained Hickory soils. These soils are on side slopes above the Shoals soil. Also included are a few areas that are protected by levees and only rarely flooded. Included areas make up 5 to 10 percent of the unit.

Water and air move through the Shoals soil at a moderate rate. Surface runoff is slow. The seasonal high water table is 0.5 foot to 1.5 feet below the surface from January through April in most years. Available water capacity is high. Organic matter content is

moderately low. The surface layer is friable and can be easily tilled when moist.

Most areas are used for cultivated crops. Some are used as hayland, pasture, or woodland. This soil is poorly suited to cultivated crops, hay, and pasture. It is moderately suited to woodland. It generally is unsuited to dwellings and septic tank absorption fields because of the flooding.

In the areas used for soybeans, corn, or small grain, a drainage system is needed. One has been installed in most areas. Measures that maintain the drainage system are needed. Additional drainage measures are needed in some areas. Surface ditches and subsurface drains can function satisfactorily if suitable outlets are available. The wetness or the flooding delays planting in some years. The flooding, however, generally does not occur during the growing season. Tilling when the soil is wet causes surface cloddiness and compaction. Returning crop residue to the soil and minimizing tillage help to maintain good tilth and increase the rate of water infiltration.

Bromegrass, orchardgrass, tall fescue, alfalfa, and alsike clover are suitable forage species on this soil. In the areas used for pasture or hay, the flooding is a hazard and the seasonal high water table is a limitation. Dikes and diversions help to control the flooding, and subsurface tile drains help to lower the water table. Overgrazing causes surface compaction and poor tilth. Proper stocking rates, rotation grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition. The flooding delays harvesting of hay in some years.

In the areas used as woodland, the seasonal high water table limits the use of equipment. Seedling mortality and plant competition also are management concerns. The use of equipment is limited to periods when the soil is firm. Planting mature nursery stock on prepared ridges reduces the seedling mortality rate. Some replanting may be necessary. The competition from undesirable plants in openings created by timber harvesting can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

The land capability classification is IVw.

533—Urban land. This map unit consists of paved areas, buildings, and stockpiles of coal and waste products. It occurs as one area at the coal-fired public utilities plant near Newton Lake. More than 85 percent of the surface is covered by buildings and pavement. Because of extensive land shaping, the unit generally is nearly level and gently sloping. Some areas near the stockpiles are sloping to very steep. The area is 320 acres in size.

Included in this unit in mapping are small areas of Orthents. Orthents are fine textured soils in cut and filled areas. They have a vegetative cover. They make up less than 10 percent of the unit.

Runoff generally is very rapid on the Urban land. Weeds and grasses grow in uncovered areas. Special management is needed when trees and shrubs are planted and after they are established. Periodic watering and applications of fertilizer also are needed.

This map unit is not assigned a land capability classification.

581B2—Tamalco silt loam, 1 to 5 percent slopes, eroded. This gently sloping, moderately well drained soil is on knolls and ridges and on side slopes along drainageways in the uplands. It has a high content of sodium in the subsoil. Individual areas are oval or irregular in shape and range from 3 to 25 acres in size.

Typically, the surface layer is mixed brown and dark yellowish brown, friable silt loam about 7 inches thick. It has been thinned by erosion. The subsoil is about 24 inches thick. It is firm. The upper part is reddish brown silty clay. The next part is yellowish brown, mottled silty clay loam. The lower part is yellowish brown, mottled silt loam. The underlying material is brown and pinkish brown, friable silt loam. It extends to a buried soil at a depth of about 49 inches. The buried soil to a depth of 60 inches or more is brown, mottled, firm silt loam. In some areas the subsoil contains less sodium. In other areas the upper part of the subsoil contains less clay. In places the seasonal high water table is within a depth of 2.5 feet.

Included with this soil in mapping are small areas of the poorly drained Cisne and somewhat poorly drained Hoyleton soils. These soils have a low content of sodium in the subsoil. Cisne soils are on broad flats below the Tamalco soil. Hoyleton soils are on ridges and knolls below the Tamalco soil. Included soils make up 5 to 15 percent of the unit.

Water and air move through the Tamalco soil at a very slow rate. Surface runoff is medium. The seasonal high water table is 2.5 to 5.0 feet below the surface from February through April in most years. Available water capacity is moderate. Organic matter content is low. The surface layer tends to crust and puddle after hard rains. The shrink-swell potential is high.

Most areas are used for cultivated crops, hay, or pasture. This soil is moderately suited to cultivated crops. It is well suited to hay and pasture. It is poorly suited to dwellings and septic tank absorption fields.

Unless the surface is protected, further erosion is a

hazard in the areas used for soybeans, corn, or small grain. A system of conservation tillage that leaves crop residue on the surface, contour farming, and a crop rotation that includes 1 or more years of meadow crops or small grain help to control erosion. The high content of sodium in the subsoil results in moisture stress during dry periods and excess moisture during wet periods. Also, it restricts the availability and uptake of some plant nutrients. Tilling when the soil is wet causes surface cloddiness and compaction and excessive runoff and erosion. Returning crop residue to the soil and regularly adding other organic material increase the rate of water infiltration and improve tilth.

A cover of grasses and legumes improves tilth and helps to control erosion. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Forage yields are low because of the high content of sodium in the subsoil and the moderate available water capacity. Proper stocking rates, rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition.

If this soil is used as a site for dwellings with basements, the seasonal high water table and the shrink-swell potential are limitations. The shrink-swell potential also is a limitation on sites for dwellings without basements. Installing subsurface tile drains near the foundations helps to overcome the wetness. Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling. Frequent watering during dry periods helps to maintain lawns.

The very slow permeability and the seasonal high water table are limitations if this soil is used as a site for septic tank absorption fields. Because of the high content of sodium in the subsoil, the soil disperses when saturated. The dispersion reduces the absorption rate. The septic tank system can function satisfactorily only if a sealed sand filter or an aerobic treatment plant is installed. Sewage lagoons function satisfactorily if the site is leveled.

The land capability classification is IIIe.

620A—Darmstadt silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on flats, broad ridges, and low knolls in the uplands. It has a high content of sodium in the subsoil. Individual areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is light brownish gray, mottled, friable silt loam about 6 inches thick. The subsoil is about 38 inches thick. It is mottled. The upper part is brown, firm silty clay. The next part is grayish brown, firm silty clay loam. The lower part is light brownish gray, firm silty clay loam. The underlying material to a depth of 60 inches or more is light brownish gray, mottled, firm silty clay loam. In some areas the subsoil contains more clay.

Included with this soil in mapping are small areas of Cisne and Hoyleton soils. Cisne soils are poorly drained. Both of the included soils have a dark surface layer and do not have a high content of sodium in the subsoil. They are in landscape positions similar to those of the Darmstadt soil. They make up 5 to 15 percent of the unit.

Water and air move through the Darmstadt soil at a very slow rate. Surface runoff is slow. The seasonal high water table is perched at a depth of 1 to 3 feet from February through May in most years. Available water capacity is moderate. Organic matter content is low. The surface layer is friable and can be easily tilled when moist. It tends to crust and puddle after hard rains, however, especially in cultivated areas where it has a high content of sodium. The shrink-swell potential is moderate.

Most areas are used for cultivated crops, pasture, or hay. This soil is moderately suited to cultivated crops, to pasture, and to hay. It is poorly suited to dwellings and septic tank absorption fields.

Most areas of this soil can be used for soybeans, corn, or small grain because a drainage system has been installed. The wetness delays planting or harvesting in some years. Shallow ditches help to remove excess surface water. The high content of sodium in the subsoil results in moisture stress during dry periods and excess moisture during wet periods. Also, it restricts the availability and uptake of some plant nutrients. Tilling when the soil is wet causes surface cloddiness and compaction and excessive runoff and erosion. Minimizing tillage, returning crop residue to the soil, and regularly adding other organic material increase the rate of water infiltration and improve tilth.

A cover of grasses and legumes improves tilth. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Forage yields are low because of the high content of sodium. Proper stocking rates, rotation grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition.

The seasonal high water table and the shrink-swell potential are limitations if this soil is used as a site for dwellings. Backfilling with sand and gravel and reinforcing footings and foundations help to prevent the structural damage caused by shrinking and swelling. Installing subsurface drains around the footings lowers the water table. Establishing or maintaining lawns is

difficult because of the high content of sodium in the subsoil. Planting salt-tolerant grasses and frequently watering during dry periods improve the lawn.

The seasonal wetness and the very slow permeability are limitations if this soil is used as a site for septic tank absorption fields. Because of the high content of sodium in the subsoil, the soil disperses when saturated. The dispersion reduces the absorption rate. The septic tank system can function satisfactorily only if a sealed sand filter or an aerobic treatment plant is installed. Sewage lagoons function well on this soil.

The land capability classification is IIIw.

620B2—Darmstadt silt loam, 2 to 5 percent slopes, eroded. This gently sloping, somewhat poorly drained soil is on side slopes along drainageways and on knolls and ridges in the uplands. It has a high content of sodium in the subsoil. Individual areas are irregular in shape and range from 3 to 80 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 5 inches thick. It has been thinned by erosion. The subsoil extends to a depth of more than 60 inches. It is mottled and firm. In sequence downward, it is brown and dark grayish brown silty clay loam, dark gray silty clay loam, light brownish gray clay loam, and light brownish gray silt loam. In some areas the subsoil contains more clay. In other areas it has a lower content of sodium.

Included with this soil in mapping are small areas of Cisne and Hoyleton soils. These soils have a dark surface layer and do not have a high content of sodium in the subsoil. The poorly drained Cisne soils are on flats below the Darmstadt soil. Hoyleton soils are closely intermingled with areas of the Darmstadt soil. Included soils make up 5 to 15 percent of the unit.

Water and air move through the Darmstadt soil at a very slow rate. Surface runoff is medium. The seasonal high water table is perched at a depth of 1 to 3 feet from February through May in most years. Available water capacity is moderate. Organic matter content is low. The surface layer is friable and can be easily tilled when moist. It tends to crust and puddle after hard rains, however, because it contains material from the subsoil and has a high content of sodium. The shrink-swell potential is moderate.

Most areas are used for cultivated crops, pasture, or hay. This soil is moderately suited to cultivated crops, to pasture, and to hay. It is poorly suited to dwellings and septic tank absorption fields.

Most areas of this soil can be used for soybeans, corn, or small grain because a drainage system has been installed. Further erosion is a hazard. It can be controlled, however, by a system of conservation tillage that leaves crop residue on the surface after planting and by contour farming. The wetness delays planting in some years. A combination of shallow ditches and drainage outlets reduces wetness. The high content of sodium in the subsoil results in moisture stress during dry periods and excess moisture during wet periods. Also, it restricts the availability and uptake of some plant nutrients. Tilling when the soil is wet causes surface cloddiness and compaction and excessive runoff and erosion. Minimizing tillage, returning crop residue to the soil, and regularly adding other organic material increase the rate of water infiltration and improve tilth.

A cover of grasses and legumes improves tilth. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Forage yields are low because of the high content of sodium. Proper stocking rates, rotation grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition.

The seasonal high water table and the shrink-swell potential are limitations if this soil is used as a site for dwellings. Backfilling with sand and gravel and reinforcing footings and foundations help to prevent the structural damage caused by shrinking and swelling. Installing subsurface drains around the footings lowers the water table. Establishing or maintaining lawns is difficult because of the high content of sodium in the subsoil. Planting salt-tolerant grasses and frequent watering during dry periods improve the lawn.

The seasonal wetness and the very slow permeability are limitations if this soil is used as a site for septic tank absorption fields. Because of the high content of sodium in the subsoil, the soil disperses when saturated. The dispersion reduces the absorption rate. The septic tank system can function satisfactorily only if a sealed sand filter or an aerobic treatment plant is installed. Sewage lagoons function well if the site is leveled.

The land capability classification is IIIe.

779D—Chelsea loamy fine sand, 7 to 18 percent slopes. This strongly sloping, excessively drained soil is on ridges and side slopes in the uplands. Individual areas are long and narrow or irregular in shape and range from 5 to 20 acres in size.

Typically, the surface layer is dark yellowish brown, very friable loamy fine sand about 6 inches thick. The subsurface layer is yellowish brown, loose fine sand about 19 inches thick. The subsoil to a depth of more than 60 inches is brownish yellow, loose sand that has bands of brown and strong brown, friable sandy loam. In some areas the subsurface layer and the upper part of the subsoil contain more clay. In places the slope is less than 7 percent or more than 18 percent.

Included with this soil in mapping are small areas of the well drained Alvin and Thebes and somewhat poorly drained Roby soils. These soils contain more clay and less sand in the upper part than the Chelsea soil. Alvin and Thebes soils are in the less sloping areas above the Chelsea soil. Roby soils are in nearly level areas below the Chelsea soil. Also included are soils in disturbed areas that have been modified by cutting and excavating for sand. Included soils make up 15 to 20 percent of the unit.

Water and air move through the Chelsea soil at a rapid rate. Surface runoff is medium. Available water capacity is low. Organic matter content also is low.

Most areas are used for pasture, hay, or woodland. Some are used for cultivated crops. This soil generally is unsuited to cultivated crops because of the hazard of erosion and the low available water capacity. It is moderately suited to pasture, hay, woodland, and dwellings. It is poorly suited to septic tank absorption fields.

In the areas used as pasture, droughtiness and low fertility are limitations and soil blowing is a hazard. Selection of drought-tolerant grasses and legumes for planting helps to maintain or improve forage stands. Bromegrass, tall fescue, and alfalfa are suitable. Fertilizer should be applied frequently and in small amounts. This method of application helps to prevent excessive loss of plant nutrients through leaching. Proper stocking rates, rotation grazing, and timely deferment of grazing help to keep the pasture in good condition and help to control soil blowing.

If this soil is used as woodland, seedling mortality is a management concern. It is caused by the low available water capacity. The seedling mortality rate can be reduced by planting nursery stock that is larger than is typical, by planting in furrows, and by mulching. Competing vegetation can be controlled by chemical or mechanical means. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

The slope is a limitation if this soil is used as a site for dwellings. Cutting and filling help to overcome this limitation.

If this soil is used as a site for septic tank absorption fields, the slope and a poor filtering capacity are limitations. The soil readily absorbs but does not adequately filter the effluent from septic tanks. The poor filtering capacity can result in the pollution of ground water. The septic tank system can function satisfactorily only if the site is leveled and a buried sand filter or an aerobic treatment plant is installed.

The land capability classification is VIs.

805C—Orthents, clayey, sloping. These fine textured, somewhat poorly drained soils have been modified by filling and leveling. They are dominantly in areas near the coal-fired public utilities complex at Newton Lake. Individual areas are square, rectangular, or irregular in shape and range from 5 to 200 acres in size.

Typically, the surface layer is yellowish brown, firm silty clay loam about 4 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown and light brownish gray, very firm silty clay loam and clay loam. Soil borings indicate that the soil material varies widely, both horizontally and vertically, and does not occur in a consistent pattern. In places these soils are moderately well drained. In some areas near the industrial complex or near the dam at Newton Lake, they are gently sloping or strongly sloping.

Included with these soils in mapping are small areas of Atlas, Bluford, Hickory, and Wynoose soils. These included soils are in nearby undisturbed areas. Also included are areas of water and urban land. Included areas make up less than 15 percent of the unit.

Water and air move through the Orthents at a varying rate because the texture varies and because the soils have been compacted to varying degrees by construction equipment. Available water capacity also varies, but it generally is high. The content of plant nutrients and organic matter generally is low.

Most of the acreage of these soils is idle land or is developed for industrial or recreational uses. Newly exposed areas do not have a plant cover, and some developed areas have a good cover of sod. Unless a good plant cover protects the surface, erosion is a severe hazard, especially in the more sloping areas. In severely eroded areas, special management is needed to establish and maintain a plant cover that controls runoff and further erosion. Onsite investigation is needed to determine the limitations or hazards affecting the development of specific areas for urban uses.

This map unit is not assigned a land capability classification.

866—Dumps, slurry. This map unit is in an area of ash and washings from the coal-fired public utilities plant near Newton Lake. It occurs as one blocky area 390 acres in size.

This area is nearly level to gently sloping. Included in this unit in mapping are areas of water and Orthents. Waterfowl are attracted to the areas of water. Vegetation is sparse.

This unit is still an active slurry dump. It varies so much that onsite investigation is needed to determine the suitability for alternative uses.

This map unit is not assigned a land capability classification.

967F—Hickory-Gosport complex, 18 to 30 percent slopes. These steep soils are on side slopes along drainageways in the uplands. The deep, well drained Hickory soil is higher on the side slopes than the moderately deep, moderately well drained Gosport soil. Individual areas are long and narrow and range from 5 to 100 acres in size. They are about 40 to 60 percent Hickory soil and 30 to 40 percent Gosport soil. The two soils occur as areas so closely intermingled or so small that mapping them separately was not practical at the selected scale.

Typically, the Hickory soil has a surface layer of very dark grayish brown, friable loam about 5 inches thick. The subsurface layer is yellowish brown, friable loam about 5 inches thick. The subsoil is firm clay loam about 38 inches thick. The upper part is strong brown and yellowish brown. The lower part is dark yellowish brown and mottled. The underlying material to a depth of 60 inches or more is yellowish brown, firm, calcareous loam. In some areas the lower part of the subsoil formed in material weathered from shale and siltstone. In other areas the soil is eroded and has a surface layer of clay loam.

Typically, the Gosport soil has a surface layer of very dark grayish brown, friable silt loam about 4 inches thick. The subsurface layer is yellowish brown, friable silt loam about 3 inches thick. The subsoil extends to weathered bedrock at a depth of about 32 inches. It is yellowish brown and firm. The upper part is silty clay loam. The lower part is mottled silty clay. The weathered bedrock to a depth of 60 inches or more is extremely firm, clayey shale. In some areas the surface layer contains more sand. In other areas the soil is eroded and contains more clay in the surface layer. In places the subsoil contains less clay.

Included with these soils in mapping are areas of the somewhat poorly drained Atlas, Bluford, and Wakeland soils. Atlas soils are on side slopes at the head of drainageways above the Hickory soil. Bluford soils are on ridgetops above the Hickory soil. Wakeland soils are on narrow flood plains below the Gosport soil. Included soils make up 5 to 20 percent of the unit.

Water and air move through the Hickory soil at a moderate rate and through the Gosport soil at a very slow rate. Surface runoff is rapid on both soils. Available water capacity is high in the Hickory soil and low in the Gosport soil. Organic matter content is moderately low in both soils. The shrink-swell potential is moderate in the Hickory soil and high in the Gosport soil.

Most areas are used as woodland. Some are used for pasture or hay. The Hickory soil is well suited to woodland and to habitat for woodland wildlife. The Gosport soil is poorly suited to woodland and moderately suited to habitat for woodland wildlife. Both soils are poorly suited to pasture and hay. They generally are unsuited to cultivated crops and to dwellings and septic tank absorption fields because of the slope of both soils and the depth to bedrock in the Gosport soil.

Erosion control is needed when grasses and legumes are established in pastured areas. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. In areas where the pasture is established, interseeding legumes on the contour with a no-till seeder improves forage quality. A permanent cover of pasture plants helps to control erosion and maintain tilth. Proper stocking rates, rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition.

In the areas used as woodland, the slope causes an erosion hazard and limits the use of equipment. Plant competition hinders the growth of desirable seedlings. Seedling mortality and windthrow are management concerns on the Gosport soil. Erosion can be controlled by building logging roads and skid trails on or nearly on the contour, by skidding logs or trees uphill with a cable and winch, by establishing grass firebreaks, and by seeding bare areas to grass or to a grass-legume mixture after logging activities have been completed. The use of machinery is limited to periods when the soils are firm. The competition from undesirable plants in openings created by timber harvesting can be controlled by chemical or mechanical means. Planting mature nursery stock and removing all vegetation within 2 feet of the planted seedlings reduce the seedling mortality rate. Some replanting may be necessary. Using a harvest method that does not isolate the remaining trees or leave them widely spaced and removing only high-value trees from a strip 50 feet wide along the west and south edges of the woodland reduce the hazard of windthrow. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soils, and damage to tree roots. Measures that protect the woodland from fire are needed.

In areas used as habitat for woodland wildlife, adequate stands of herbaceous plants can be maintained. Because of the slope and low fertility, however, establishing adequate stands of grain and seed crops is difficult. Measures that protect the habitat from fire and from grazing by livestock are needed.

The land capability classification is VIIe.

967G—Hickory-Gosport complex, 30 to 60 percent slopes. These very steep soils are on side slopes along drainageways in the uplands. The deep, well drained Hickory soil is on side slopes above the moderately deep, moderately well drained Gosport soil. Individual areas are long and narrow and range from 5 to 60 acres in size. They are about 40 to 60 percent Hickory soil and 30 to 40 percent Gosport soil. The two soils occur as areas so closely intermingled or so small that mapping them separately was not practical at the selected scale.

Typically, the Hickory soil has a surface layer of very dark grayish brown, friable loam about 5 inches thick. The subsurface layer is yellowish brown, friable loam about 5 inches thick. The subsoil is firm clay loam about 38 inches thick. The upper part is strong brown and yellowish brown. The lower part is dark yellowish brown and mottled. The underlying material to a depth of 60 inches or more is yellowish brown, firm, calcareous loam. In some areas the lower part of the subsoil formed in material weathered from shale and siltstone. In other areas the soil is eroded and has a surface layer of silty clay loam or clay loam.

Typically, the Gosport soil has a surface layer of very dark grayish brown, friable silt loam about 4 inches thick. The subsurface layer is yellowish brown, friable silt loam about 3 inches thick. The subsoil extends to weathered bedrock at a depth of about 32 inches. It is yellowish brown and firm. The upper part is silty clay loam. The lower part is mottled silty clay. The weathered bedrock to a depth of 60 inches or more is extremely firm, clayey shale. In some areas the surface layer contains more sand. In other areas the soil is eroded and contains more clay in the surface layer. In places the subsoil contains less clay.

Included with these soils in mapping are areas of the somewhat poorly drained Atlas, Bluford, and Wakeland soils. Atlas soils are on side slopes at the head of drainageways above the Hickory soil. Bluford soils are on ridgetops above the Hickory soil. Wakeland soils are on narrow flood plains below the Gosport soil. Included soils make up 5 to 20 percent of the unit.

Water and air move through the Hickory soil at a moderate rate and through the Gosport soil at a very slow rate. Surface runoff is rapid on both soils. Available water capacity is high in the Hickory soil and low in the Gosport soil. Organic matter content is moderately low in both soils. The shrink-swell potential is moderate in the Hickory soil and high in the Gosport soil.

Most areas are used as woodland. The Hickory soil is moderately suited to woodland and well suited to woodland wildlife habitat. The Gosport soil is poorly suited to woodland and moderately suited to woodland wildlife habitat. The soils generally are unsuited to cultivated crops and to dwellings and septic tank absorption fields because of the slope of both soils and the moderate depth to bedrock in the Gosport soil.

In the areas used as woodland, the slope causes an erosion hazard and limits the use of equipment. Plant competition hinders the growth of desirable seedlings. Seedling mortality and windthrow are management concerns on the Gosport soil. Erosion can be controlled by building logging roads and skid trails on or nearly on the contour, by skidding logs or trees uphill with a cable and winch, by establishing grass firebreaks, and by seeding bare areas to grass or to a grass-legume mixture after logging activities have been completed. The use of machinery is limited to periods when the soils are firm. The competition from undesirable plants in openings created by timber harvesting can be controlled by chemical or mechanical means. Planting mature nursery stock and removing all vegetation within 2 feet of the planted seedlings reduce the seedling mortality rate. Some replanting may be necessary. Using a harvest method that does not isolate the remaining trees or leave them widely spaced and removing only high-value trees from a strip 50 feet wide along the west and south edges of the woodland reduce the hazard of windthrow. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soils, and damage to tree roots. Measures that protect the woodland from fire are needed.

In areas used as habitat for woodland wildlife, adequate stands of herbaceous plants can be maintained. Because of the slope and low fertility, however, establishing adequate stands of grain and seed crops is difficult. Measures that protect the habitat from fire and from grazing by livestock are needed.

The land capability classification is VIIe.

991—Cisne-Huey silt loams. These nearly level, poorly drained soils are on broad flats in the uplands. The Huey soil is ponded for brief periods from March through June. It has a high content of sodium in the subsoil. Individual areas are irregular in shape and range from 10 to 80 acres in size. They are about 50 to 60 percent Cisne soil and 40 to 50 percent Huey soil. The two soils occur as areas so closely intermingled or so small that mapping them separately was not practical at the selected scale.

Typically, the Cisne soil has a surface layer of very dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is grayish brown and light brownish gray, friable silt loam about 8 inches thick. The subsoil to a depth of more than 60 inches is mottled, firm silty clay loam. The upper part is light

brownish gray and grayish brown. The lower part is gray. In some areas the surface layer is lighter in color. In other areas the upper part of the subsoil contains less clay.

Typically, the Huey soil has a surface layer of dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is light brownish gray, friable silt loam about 3 inches thick. The subsoil to a depth of more than 60 inches is mottled, firm silty clay loam. The upper part is grayish brown and brown. The lower part is light brownish gray. In places the soil is deeper to a high content of sodium.

Water and air move through both soils at a very slow rate. Surface runoff is slow on the Cisne soil and slow to ponded on the Huey soil. The seasonal high water table is perched within a depth of 2.0 feet from February through June in the Cisne soil and is 0.5 foot above to 2.0 feet below the surface of the Huey soil from March through June. Available water capacity is high in the Cisne soil and moderate in the Huey soil. Organic matter content is moderately low in both soils. The surface layer is friable and can be easily tilled when moist. The shrink-swell potential is high in the Cisne soil and moderate in the Huey soil.

Most areas are used for cultivated crops. Some are used for pasture or hay. These soils are poorly suited to cultivated crops. They are moderately suited to pasture and hay. They generally are unsuited to dwellings and septic tank absorption fields because of the seasonal high water table and the very slow permeability.

Most areas of these soils can be used for soybeans, corn, or small grain because a drainage system has been installed. The wetness of both soils and the high content of sodium in the Huey soil are limitations. The sodium in the subsoil of the Huey soil results in moisture stress during dry periods and in excess moisture during wet periods. Also, it restricts the availability and uptake of some plant nutrients. A combination of shallow ditches and drainage outlets reduces the wetness. Tilling when the soils are wet causes surface compaction and cloddiness and decreases the rate of water infiltration. Minimizing tillage, returning crop residue to the soils, and adding other organic material increase the infiltration rate and improve tilth and fertility.

A cover of pasture plants or hay improves tilth. The wetness limits the choice of plants and the period of grazing or cutting. Reed canarygrass and alsike clover are suitable. Shallow ditching and land smoothing are helpful in reducing the wetness. Applications of fertilizer, weed control, rotation grazing, proper stocking rates, timely harvesting, and timely deferment of grazing help to keep the pasture or hayland in good condition.

The land capability classification is IVw.

3071—Darwin silty clay, frequently flooded. This nearly level, very poorly drained soil is in swales on flood plains. It is in areas that are unprotected by levees and is frequently flooded for long periods from January through June. It is subject to ponding. Individual areas are long and narrow or irregular in shape and range from 5 to 200 acres in size.

Typically, the surface layer is very dark gray, firm silty clay about 6 inches thick. The subsurface layer is very dark grayish brown, mottled silty clay about 5 inches thick. The subsoil to a depth of more than 60 inches is gray, mottled, very firm silty clay. In some areas the surface soil is lighter in color. In other areas the dark surface soil is less than 10 inches thick. In places the soil contains less clay throughout.

Included with this soil in mapping are small areas of the poorly drained Petrolia and somewhat poorly drained Wakeland soils. These soils are in positions on the flood plains similar to those of the Darwin soil or are slightly higher on the flood plains. They make up about 10 to 20 percent of the unit.

Water and air move through the Darwin soil at a very slow rate. Surface runoff is slow to ponded. The seasonal high water table is 1 foot above the surface to 2 feet below from January through June in most years. Available water capacity is moderate. Organic matter content also is moderate. The shrink-swell potential is very high, and wide cracks form during dry periods. The surface layer is firm and cannot be easily tilled when moist. It tends to crust and puddle after hard rains.

Most areas are used for cultivated crops. Some are used for pasture, hay, or woodland. This soil is poorly suited to cultivated crops, pasture, hay, and woodland. It is well suited to habitat for wetland wildlife. It generally is unsuited to dwellings and septic tank absorption fields because of the flooding.

A drainage system is needed in the areas used for corn or soybeans. One has been installed in most areas. In some areas, however, additional surface ditches and drainage outlets are needed. The flooding occurs during the growing season in most years. The flooding and the wetness can delay planting or damage crops. Installing flood-protection measures, carefully timing fieldwork, and selecting suitable varieties for planting help to overcome the hazard of flooding and the wetness. Tilling when the soil is wet causes surface cloddiness and compaction. Minimizing tillage and returning crop residue to the soil improve tilth and increase the rate of water infiltration.

Reed canarygrass and alsike clover are suitable forage species on this soil. In the areas used for pasture or hay, a combination of surface ditches and drainage outlets is needed to remove excess water. Including grasses and legumes in the cropping

sequence improves tilth. Harvesting and grazing during wet periods and overgrazing reduce forage yields and cause surface compaction and poor tilth. Selection of forage species that can tolerate the long periods of wetness, proper stocking rates, applications of fertilizer, and restricted use during wet periods help to keep the pasture in good condition.

In the areas used as woodland, the seasonal high water table limits the use of equipment. Seedling mortality and plant competition also are management concerns. The use of equipment is limited to periods when the soil is firm. Planting mature nursery stock on prepared ridges reduces the seedling mortality rate. Some replanting may be necessary. The competition from undesirable plants in openings created by timber harvesting can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

This soil provides good habitat for wetland wildlife. Intermittent shallow water areas are common. They provide important habitat elements, such as wetland plants. In many areas grain and seed crops provide food and cover for wetland wildlife.

The land capability classification is IVw.

3288—Petrolia silty clay loam, frequently flooded. This nearly level, poorly drained soil is in broad, low areas on flood plains. It is in areas that are unprotected by levees and is frequently flooded for long periods from March through June. It is subject to ponding. Individual areas are long and narrow or irregular in shape and range from 5 to more than 300 acres in size.

Typically, the surface layer is dark grayish brown, friable silty clay loam about 6 inches thick. The underlying material to a depth of 60 inches or more is gray, mottled, firm silty clay loam. It has strata of loam in the lower part. In some areas the surface layer is dark. In other areas the soil has more sand throughout. In some places, the upper part of the soil has a higher proportion of brown colors and depth to the seasonal high water table is more than 3 feet. In other places the soil has more clay throughout.

Included with this soil in mapping are small areas of the well drained Haymond soils on the higher parts of the flood plains and the very poorly drained Darwin soils on the slightly lower parts. Also included are small areas of intermittent water. Included areas make up 10 to 15 percent of the unit.

Water and air move through the Petrolia soil at a moderately slow rate. Surface runoff is slow to ponded. The seasonal high water table is 0.5 foot above the surface to 3.0 feet below from April through June in most years. Available water capacity is high. Organic matter content is moderate. The surface layer is friable and can be easily tilled when moist, but it tends to crust and puddle after hard rains.

Most areas are used for cultivated crops. Some are used for pasture, hay, or woodland. This soil is moderately suited to cultivated crops, pasture, hay, woodland, and habitat for woodland wildlife. It is well suited to habitat for wetland wildlife. It generally is unsuited to dwellings and septic tank absorption fields because of the flooding.

A drainage system is needed in the areas used for corn or soybeans. One has been installed in most areas. In some areas, however, additional surface ditches or subsurface drains and drainage outlets are needed. The flooding occurs during the growing season in some years. The flooding and the wetness can delay planting and damage crops. Installing flood-protection measures, carefully timing fieldwork, and selecting suitable varieties for planting help to overcome the hazard of flooding and the wetness. Tilling when the soil is wet causes surface cloddiness and compaction. Minimizing tillage and returning crop residue to the soil help to maintain good tilth and increase the rate of water infiltration.

Reed canarygrass and alsike clover are suitable forage species on this soil. In the areas used for pasture or hay, a combination of surface ditches or subsurface drains and drainage outlets is needed to remove excess water. Including grasses and legumes in the cropping sequence helps to maintain tilth. Harvesting or grazing during wet periods and overgrazing reduce forage yields and cause surface compaction and poor tilth. Proper stocking rates, applications of fertilizer, and restricted use during wet periods help to keep the pasture in good condition.

In the areas used as woodland, the seasonal high water table limits the use of equipment. Seedling mortality and plant competition also are management concerns. The use of equipment is limited to periods when the soil is firm. Planting mature nursery stock on prepared ridges reduces the seedling mortality rate. Some replanting may be necessary. The competition from undesirable plants in openings created by timber harvesting can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

This soil provides good habitat for wetland wildlife. Intermittent shallow water areas are common. They provide important habitat elements, such as wild

herbaceous plants and wetland plants. In many areas grain and seed crops provide food and cover for wetland wildlife. Some areas are adjacent to major streams, which provide habitat for game fish.

In areas used as habitat for woodland wildlife, adequate stands of wild herbaceous plants can be maintained. The trees that can withstand the seasonal wetness and frequent flooding survive and grow well. Other important habitat elements also are available. Measures that protect the habitat from fire and from grazing by livestock are needed.

The land capability classification is IIIw.

3304—Landes fine sandy loam, frequently flooded. This nearly level, well drained soil is on narrow swells and slight rises on flood plains. It is in areas that are unprotected by levees and is frequently flooded for brief periods from January through June. Individual areas are long and narrow and range from 5 to 200 acres in size.

Typically, the surface layer is dark brown, friable fine sandy loam about 7 inches thick. The subsurface layer also is dark brown, friable fine sandy loam. It is about 5 inches thick. The subsoil is about 23 inches thick. It is dark yellowish brown. The upper part is very friable loamy fine sand. The lower part is friable fine sandy loam. The underlying material to a depth of 60 inches or more is dark yellowish brown and yellowish brown, very friable fine sandy loam and loose loamy sand that has strata of sandy loam. In some areas the surface layer is lighter in color. In other areas the soil contains less clay and more sand throughout. In some places the lower part of the subsoil has gray mottles. In other places the soil contains more clay in the upper part.

Included with this soil in mapping are small areas of the somewhat poorly drained Wakeland and poorly drained Petrolia soils. These soils are in the lower areas on flood plains and in old stream channels below the Landes soil. They make up 10 to 15 percent of the unit.

Water and air move through the upper part of the Landes soil at a moderately rapid rate and through the lower part at a rapid rate. Surface runoff is slow. Available water capacity is moderate. Organic matter content is moderately low. The surface layer is friable and can be easily tilled when moist.

Most areas are used for cultivated crops. Some are used for pasture or hay. This soil is moderately suited to cultivated crops. It is well suited to pasture, hay, and woodland. It generally is unsuited to dwellings and septic tank absorption fields because of the flooding.

In the areas used for corn or soybeans, the flooding is a hazard, but it does not occur during the growing season in most years. Soil blowing also is a hazard, and the moderate available water capacity is a limitation. Field windbreaks and a system of conservation tillage that leaves crop residue on the surface after planting help to control soil blowing and prevent the crop damage caused by windblown soil particles. Returning crop residue to the soil and regularly adding other organic material conserve moisture, help to maintain tilth, and improve fertility.

Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable forage species on this soil. The moderate available water capacity is a limitation in the areas used for pasture or hay. Overgrazing reduces forage yields and causes surface compaction and poor tilth. Proper stocking rates, rotation grazing, applications of fertilizer, and restricted use during wet periods help to keep the pasture in good condition.

If this soil is used as woodland, plant competition is a management concern. It hinders the growth of desirable seedlings. The competition in openings where timber has been harvested can be controlled by chemical or mechanical means. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

The land capability classification is IIIw.

3331—Haymond silt loam, frequently flooded. This nearly level, well drained soil is on flood plains. It is in areas that are unprotected by levees and is frequently flooded for brief periods from January through May. Individual areas are long and narrow and range from 5 to more than 200 acres in size.

Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsoil is dark yellowish brown, friable silt loam about 33 inches thick. The underlying material to a depth of 60 inches or more is dark yellowish brown and yellowish brown, friable fine sandy loam. In some areas the surface layer is darker. In other areas the soil contains more clay or sand throughout. In some places the lower part of the underlying material is gray. In other places the slope is more than 2 percent.

Included with this soil in mapping are small areas of the poorly drained Petrolia soils. These soils are in the low areas on the flood plains. Also included are small areas of soils that are intermittently ponded. Included soils make up 10 to 20 percent of the unit.

Water and air move through the Haymond soil at a moderate rate. Surface runoff is slow. Available water capacity is high. Organic matter content is moderately low. The surface layer is friable and can be easily tilled when moist.

Most areas are used for cultivated crops. Some are used for pasture, hay, or woodland. This soil is well

suited to cultivated crops, pasture, hay, and woodland. It generally is unsuited to dwellings and septic tank absorption fields because of the flooding.

In the areas used for corn or soybeans, the flooding is a hazard, but it does not occur during the growing season in most years. Tilling when the soil is wet causes surface cloddiness and compaction. Minimizing tillage and returning crop residue to the soil help to maintain good tilth and increase the rate of water infiltration.

Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable forage species on this soil. In the areas used as pasture, overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction, excessive runoff, and poor tilth. Levees minimize the damage caused by floodwater in some years. Proper stocking rates, rotation grazing, and deferred grazing when the soil is wet help to keep the soil and pasture in good condition.

If this soil is used as woodland, plant competition is a management concern. It hinders the growth of desirable seedlings. The competition in openings where timber has been harvested can be controlled by chemical or mechanical means. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

The land capability classification is IIw.

3333—Wakeland silt loam, frequently flooded. This nearly level, somewhat poorly drained soil is on flood plains. It is in areas that are unprotected by levees and is frequently flooded for brief periods from January through May. Individual areas are long and narrow or irregular in shape and range from 5 to more than 300 acres in size.

Typically, the surface layer is brown, mottled, friable silt loam about 9 inches thick. The underlying material to a depth of 60 inches or more is mottled, very friable and friable silt loam. The upper part is grayish brown. The next part is brown. The lower part is grayish brown. In some areas the underlying material contains more clay. In other areas the surface layer is darker. In some places the underlying material contains more sand. In other places the seasonal high water table is within 1 foot of the surface.

Included with this soil in mapping are small areas of soils that are intermittently ponded. These soils make up 5 to 10 percent of the unit.

Water and air move through the Wakeland soil at a moderate rate. Surface runoff is slow. The seasonal high water table is 1 to 3 feet below the surface from January through April in most years. Available water capacity is very high. Organic matter content is moderately low. The surface layer is friable and can be easily tilled when moist.

Most areas are used for cultivated crops. Some are used for hay, pasture, or woodland. This soil is well suited to cultivated crops, hay, pasture, and woodland. It generally is unsuited to dwellings and septic tank absorption fields because of the flooding.

In the areas used for corn or soybeans, a drainage system is needed. One has been installed in most areas. In some cultivated areas, however, additional surface ditches or subsurface drains and drainage outlets are needed. The wetness or the flooding delays planting in some years. The flooding, however, generally does not occur during the growing season. Installing flood-protection measures, carefully timing fieldwork, and selecting suitable varieties for planting help to overcome the hazard of flooding and the wetness. Tilling when the soil is wet causes surface cloddiness and compaction. Returning crop residue to the soil and minimizing tillage help to maintain good tilth and increase the rate of water infiltration.

Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable forage species on this soil. In the areas used as pasture, overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction, excessive runoff, and poor tilth. Levees minimize the damage caused by floodwater in some years. Proper stocking rates, rotation grazing, and deferred grazing when the soil is wet help to keep the pasture in good condition.

If this soil is used as woodland, plant competition is a management concern. It hinders the growth of desirable seedlings. The competition in openings where timber has been harvested can be controlled by chemical or mechanical means. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

The land capability classification is IIw.

7071—Darwin silty clay, rarely flooded. This nearly level, very poorly drained soil is in swales on flood plains. It is in areas that are protected by levees along the Embarras River. It is subject to rare flooding and to ponding. Individual areas are long and narrow or irregular in shape and range from 5 to 200 acres in size.

Typically, the surface layer is very dark grayish brown, firm silty clay about 13 inches thick. The subsoil to a depth of more than 60 inches is gray and dark gray, mottled, firm silty clay. In some areas the surface layer is lighter in color. In other areas the dark surface

soil is less than 10 inches thick. In places the soil contains less clay throughout. In a few small areas near the base of bluffs, the soil is occasionally flooded by water that overtops a diversion levee.

Included with this soil in mapping are small areas of the poorly drained Petrolia and somewhat poorly drained Wakeland soils. These soils are in landscape positions similar to those of the Darwin soil or are slightly higher on the flood plains. Also included are some areas of soils that are intermittently ponded. Included soils make up 10 to 20 percent of the unit.

Water and air move through the Darwin soil at a very slow rate. Surface runoff is slow to ponded. The seasonal high water table is 1 foot above the surface to 2 feet below from January through June in most years. Available water capacity is moderate. Organic matter content also is moderate. The surface layer is firm and cannot be easily tilled when moist. It tends to crust and puddle after hard rains. The shrink-swell potential is very high.

Most areas are cultivated. This soil is moderately suited to cultivated crops. It is well suited to pasture and hay. It generally is unsuited to dwellings and septic tank absorption fields because of the flooding. Flooding is a hazard because of the possibility of a break in a levee during high flood stages.

A drainage system is needed in the areas used for corn, soybeans, or small grain. One has been installed in most areas. Measures that maintain the drainage system are needed. In some areas additional drainage measures, such as a combination of surface ditches and drainage outlets, are needed. The wetness can delay planting in some years. Carefully timing fieldwork and selecting suitable varieties for planting help to overcome the wetness. Tilling when the soil is wet causes surface cloddiness and compaction. Minimizing tillage and returning crop residue to the soil improve tilth and increase the rate of water infiltration.

Reed canarygrass and alsike clover are suitable forage species on this soil. In the areas used for pasture or hay, the ponding is a hazard. It can be controlled by surface drains, ditches, and surface inlet tile. Deferment of grazing when the soil is too wet helps to prevent surface compaction and deterioration of tilth. Proper stocking rates, rotation grazing, and applications of fertilizer help to keep the pasture in good condition.

The land capability classification is IIIw.

7288—Petrolia silty clay loam, rarely flooded. This nearly level, poorly drained soil is in broad, low areas on flood plains. It is in areas that are protected by levees along the Embarras River. It is subject to rare flooding and to ponding. Individual areas are long and narrow or irregular in shape and range from 5 to more than 300 acres in size.

Typically, the surface layer is dark grayish brown, friable silty clay loam about 8 inches thick. The underlying material to a depth of 60 inches or more is dark gray and gray, mottled, friable silty clay loam. In some places the surface layer is darker. In other places the soil contains more clay or less clay throughout. In some areas, the upper part of the soil has a higher proportion of brown colors and depth to the seasonal high water table is more than 3 feet. In a few small areas near the base of bluffs, the soil is occasionally flooded by water that overtops a diversion levee.

Included with this soil in mapping are small areas of the well drained Haymond soils. These soils are higher on the flood plains than the Petrolia soil. Also included are small areas of the very poorly drained Darwin soils, which are slightly lower on the landscape than the Petrolia soil. Included soils make up 5 to 10 percent of the unit.

Water and air move through the Petrolia soil at a moderately slow rate. Surface runoff is slow to ponded. The seasonal high water table is 0.5 foot above the surface to 3.0 feet below from April through June in most years. Available water capacity is high. Organic matter content is moderate. The surface layer is friable and can be easily tilled when moist. It tends to crust and puddle after hard rains.

Most areas are used for cultivated crops. Some are used for pasture or hay. This soil is well suited to cultivated crops, to pasture, and to hay. It generally is unsuited to dwellings and septic tank absorption fields because of the flooding. Flooding is a hazard because of the possibility of a break in a levee during high flood stages.

A drainage system is needed in the areas used for corn, soybeans, or small grain. One has been installed in most areas. Measures that maintain the drainage system are needed. In some areas additional drainage measures, such as a combination of surface ditches or subsurface drains and drainage outlets, are needed. The wetness delays planting in some years. Carefully timing fieldwork and selecting suitable varieties for planting help to overcome the wetness. Tilling when the soil is wet causes surface cloddiness and compaction. Minimizing tillage and returning crop residue to the soil help to maintain good tilth and increase the rate of water infiltration.

Reed canarygrass and alsike clover are suitable forage species on this soil. In the areas used for pasture or hay, the ponding is a hazard. It can be controlled by surface drains, ditches, and surface inlet tile. Deferment of grazing when the soil is wet helps to prevent surface compaction and deterioration of tilth.

Proper stocking rates, rotation grazing, and applications of fertilizer help to keep the pasture in good condition.

The land capability classification is IIw.

7304—Landes fine sandy loam, rarely flooded. This nearly level, well drained soil is on narrow swells and slight rises on flood plains. It is in areas that are protected by levees along the Embarras River. It is subject to rare flooding. Individual areas are long and narrow and range from 5 to 200 acres in size.

Typically, the surface layer is dark brown, friable fine sandy loam about 12 inches thick. The subsoil is brown, very friable very fine sandy loam about 11 inches thick. The underlying material to a depth of 60 inches or more is pale brown, loose very fine sand that has strata of brown very fine sandy loam and light gray sand. In some areas the surface layer is lighter in color. In other areas the soil contains less clay and more sand throughout. In some places the lower part of the subsoil has gray mottles. In other places the soil contains more clay in the upper part.

Included with this soil in mapping are small areas of the somewhat poorly drained Wakeland and poorly drained Petrolia soils. These soils are on the lower parts of the flood plains and in old stream channels below the Landes soil. Included soils make up 5 to 10 percent of the unit.

Water and air move through the upper part of the Landes soil at a moderately rapid rate and through the lower part at a rapid rate. Surface runoff is slow. Available water capacity is moderate. Organic matter content is moderately low. The surface layer is friable and can be easily tilled when moist.

Most areas are used for cultivated crops. Some are used for pasture or hay. This soil is well suited to cultivated crops, to pasture, and to hay. It generally is unsuited to dwellings and septic tank absorption fields because of the flooding. Flooding is a hazard because of the possibility of a break in a levee during high flood stages.

In the areas used for corn, soybeans, or small grain, soil blowing is a hazard and the moderate available water capacity is a limitation. Field windbreaks and a system of conservation tillage that leaves crop residue on the surface after planting help to control soil blowing and prevent the crop damage caused by windblown soil particles. Returning crop residue to the soil and regularly adding other organic material conserve moisture, help to maintain tilth, and improve fertility.

Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable forage species on this soil. The moderate available water capacity is a limitation in the areas used for pasture or hay. Overgrazing reduces forage yields and causes surface compaction and poor tilth. Proper stocking rates, rotation grazing, applications of fertilizer, and restricted use during wet periods help to keep the pasture in good condition.

The land capability classification is IIs.

7331—Haymond silt loam, rarely flooded. This nearly level, well drained soil is on flood plains. It is in areas that are protected by levees along the Embarras River. It is subject to rare flooding. Individual areas are long and narrow and range from 5 to 100 acres in size.

Typically, the surface layer is brown, friable silt loam about 11 inches thick. The subsoil is dark yellowish brown and yellowish brown, friable silt loam about 30 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown, friable, stratified silt loam and very fine sandy loam. In some areas the surface layer is darker. In other areas the soil contains more sand or clay throughout. In some places the lower part of the underlying material is gray. In other places the slope is more than 2 percent. In some areas the subsoil and underlying material are more acid. In a few small areas near the base of bluffs, the soil is occasionally flooded by water that overtops a diversion levee.

Included with this soil in mapping are small areas of the poorly drained Petrolia soils. These soils are lower on the flood plains than the Haymond soil. Also included are small areas of soils that are intermittently ponded. Included soils make up 5 to 10 percent of the unit.

Water and air move through the Haymond soil at a moderate rate. Surface runoff is slow. Available water capacity is high. Organic matter content is moderately low. The surface layer is friable and can be easily tilled when moist.

Most areas are used for cultivated crops. Some are used for pasture or hay. This soil is well suited to cultivated crops, to pasture, and to hay. It generally is unsuited to dwellings and septic tank absorption fields because of the flooding. Flooding is a hazard because of the possibility of a break in a levee during high flood stages.

No major limitations affect the use of this soil for corn, soybeans, or small grain. A conservation tillage system that leaves crop residue on the surface after planting helps to maintain tilth and fertility.

Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable forage species on this soil. In the areas used as pasture, overgrazing reduces forage production and causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, rotation grazing, and deferred grazing when the soil is wet help to keep the pasture in good condition.

The land capability classification is I.

7333—Wakeland silt loam, rarely flooded. This nearly level, somewhat poorly drained soil is on flood plains. It is in areas that are protected by levees along the Embarras River. It is subject to rare flooding. Individual areas commonly are long and narrow or irregular in shape and range from 5 to 200 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The underlying material to a depth of 60 inches or more is mottled, friable silt loam. The upper part is grayish brown. The lower part is light brownish gray. In some areas the underlying material contains more sand or more clay. In other areas the surface layer is darker. In places a seasonal high water table is within a depth of 1 foot. In a few small areas near the base of bluffs, the soil is occasionally flooded by water that overtops a diversion levee.

Included with this soil in mapping are small areas of the very poorly drained Darwin soils. These soils are in areas below the Wakeland soil and are subject to ponding. They make up 5 to 10 percent of the unit.

Water and air move through the Wakeland soil at a moderate rate. Surface runoff is slow. The seasonal high water table is 1 to 3 feet below the surface from January through April in most years. Available water capacity is very high. Organic matter content is moderately low. The surface layer is friable and can be easily tilled when moist.

Most areas are used for cultivated crops. Some are used for hay or pasture. This soil is well suited to cultivated crops, hay, and pasture. It generally is unsuited to dwellings and septic tank absorption fields because of the flooding. Flooding is a hazard because of the possibility of a break in a levee during high flood stages.

In the areas used for soybeans, corn, or small grain, a drainage system is needed. One has been installed in most areas. Measures that maintain the drainage system are needed. In some areas additional drainage measures, such as a combination of surface ditches or subsurface drains and drainage outlets, are needed. The wetness delays planting in some years. Carefully timing fieldwork and selecting suitable varieties for planting help to overcome the wetness. Tilling when the soil is wet causes surface cloddiness and compaction. Returning crop residue to the soil and minimizing tillage help to maintain good tilth and increase the rate of water infiltration.

Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable forage species on this soil. In the areas used as pasture, overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction, excessive runoff, and poor tilth. Installing subsurface tile drains helps to overcome the wetness. Proper stocking rates, rotation grazing, and deferred grazing when the soil is wet help to keep the soil and pasture in good condition.

The land capability classification is IIw.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban or built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal expenditure of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Soil Conservation Service.

About 216,000 acres in the survey area, or nearly 68 percent of the total acreage, meets the soil requirements for prime farmland. Scattered areas of this land are throughout the county, but most are in associations 1 and 4, which are described under the heading "General Soil Map Units." This land generally is used for crops. The crops grown on this land, mainly corn, soybeans, and winter wheat, account for most of the county's total agricultural income each year.

A recent trend in land use in some parts of the county has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which

generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in Jasper County that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils that have a seasonal high water table and all soils that are frequently flooded during the growing season qualify for prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. The need for these measures is indicated after the map unit name in table 5. Onsite evaluation is needed to determine whether or not these limitations have been overcome by corrective measures. In Jasper County most of the naturally wet soils have been adequately drained.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the limitations of each soil for specific land uses and to help to prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Dennis Clancy, district conservationist, Soil Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Approximately 231,000 acres in Jasper County is cropland. Of this acreage, 81,000 acres is used for corn, 110,000 acres for soybeans, and 21,000 acres for wheat. Grain sorghum, other small grain, and truck crops also are grown *(15)*. About 9,000 acres in the county is permanent pasture, and approximately 7,000 acres is used for hay.

The acreage used for wheat and soybeans has increased in recent years because of an increase in the extent to which soybeans are double-cropped with winter wheat. Conventional planting of soybeans after wheat is the most common practice, but the acreage on which soybeans are planted into wheat stubble by a no-till system is increasing. In years that are extremely wet during the fall harvest, the acreage planted to winter wheat greatly decreases because the corn and soybeans are harvested too late in the year for the wheat to be sown.

The acreage used for corn does not change dramatically from year to year. Most of it is still planted by conventional tillage methods, although the acreage planted by conservation tillage methods is increasing. Minimum tillage is the most common form of conservation tillage. No-till planting and ridge tillage are less common.

The acreage used for soybeans has increased in recent years. Most of the acreage is planted by conventional methods. In some areas, however, full-season soybeans and short-season soybeans that are double-cropped with wheat are planted by no-till methods. Ridge tillage of soybeans is becoming more common.

The chief management needs on the cropland and

pasture in the county are resource management systems that control erosion, that maintain or improve drainage, and that maintain fertility and tilth.

Erosion is a major problem on about 28 percent of the cropland and 10 percent of the pasture in the county. On cropland where soil loss exceeds the tolerable limits ("T" value), erosion averages almost 14 tons of soil per acre per year. In pastured areas where erosion is a problem, about 8 tons of soil per acre per year is lost. The average rate of erosion in areas used for row crops, pasture, hay, or woodland in the county is about 6 tons of soil per acre per year. The average "T" value in the county is approximately 4 tons of soil per acre per year.

Most of the erosion is sheet and rill erosion caused by water. Some is gully erosion or ephemeral erosion. Gully erosion is caused by a concentrated flow of water, which removes large amounts of soil in relatively small areas. Gullies are not easily eliminated by normal farming operations. Ephemeral erosion, also called megarill erosion, is similar to gully erosion, except that normal farming operations can remove the megarills.

Erosion reduces productivity as the surface layer is removed and part of the subsoil is incorporated into the plow layer. Valuable plant nutrients are lost with the surface layer. Tilth deteriorates as the more clayey subsoil is mixed with the plow layer.

Erosion also reduces the rate at which water enters the soil. When the infiltration rate decreases, the runoff rate increases and damage occurs downstream. The offsite damage includes flood damage and the sedimentation of lakes, rivers, road ditches, drainage ditches, and ponds.

The damaging effects of erosion can be greatly reduced through the application of conservation practices. In Jasper County the most common measures are grassed waterways, parallel tile outlet and gradient terraces, diversions, grade-stabilization structures, conservation cropping systems, conservation tillage, critical area seeding, conversion of marginal cropland to properly managed pasture or hayland, contour farming, field drainage ditches, and ponds.

Grassed waterways remove concentrated water safely from a cropped field to a stable outlet. They commonly are used in conjunction with gradient terraces. These terraces channel water safely to an outlet, such as a grassed waterway. In areas where diversions are used, a grassed waterway also can function as a safe and stable outlet.

Parallel tile outlet terraces help to remove excess water through underground field tile. They also reduce the hazard of erosion by shortening the length of slopes and reducing the concentration of water. If constructed on the contour, they provide the benefits of contour farming.

Diversions direct water away from highly erodible areas. They protect areas against excessive runoff from the higher adjacent areas. They may be temporary or permanent.

Grade-stabilization structures help to maintain the gradient where a sudden drop in elevation occurs, such as in a grassed waterway, diversion, or other surface channel. Construction materials may include concrete, aluminum, or earthfill. These structures help to prevent gullying in areas where grassed waterways terminate at an outlet.

A cropping sequence can include row crops, small grain, and hay or pasture. In the more gently sloping areas, row crops generally can be grown intensively without excessive erosion. As slope increases, a conservation cropping system, which includes fewer years of row crops and more years of small grain and meadow crops, is needed to control erosion.

Conservation tillage leaves a protective amount of crop residue on the surface after planting. As the amount of crop residue left on the surface increases, the hazards of soil blowing and sheet and rill erosion decrease.

A minimum of 30 percent of the surface must be covered by crop residue after planting for a tillage system to qualify as a conservation tillage system. In areas where a crop is planted by the no-till method into heavy sod, more than 90 percent of the surface may be covered by crop residue. Moldboard plowing covers almost all of the residue. A chisel plow with straight shanks removes about 25 percent of the residue; a chisel plow with twisted shanks, about 60 percent; and a tandem disk after harvest, about 15 percent. The amount of residue left on the surface after any tillage operation varies, depending on the speed of the operation, the size of the equipment, soil conditions, and other factors.

Conservation tillage is a cost-effective conservation measure. In row cropped areas where the rate of sheet and rill erosion is high, conservation tillage should be an integral part of the resource management system.

Critical area seeding is necessary where sod-protecting vegetation is needed to prevent extremely high erosion rates. It is common on construction sites, road cuts or embankments, dams, and other highly erodible sites. Grass is seeded either with or without legumes on these sites.

Marginal cropland that is excessively eroded can be converted to pasture or hayland, which is a more productive, less damaging land use. The hayland and pasture require proper management, such as

applications of fertilizer, proper stocking rates, good harvesting methods, and renovation measures. This management helps to prevent excessive erosion.

Contour farming helps to control runoff and erosion. Tilling, planting, and cultivating on the contour can cut sheet and rill erosion rates in half.

Ponds help to prevent the formation of gullies. Also, they can be a valuable water supply for people, livestock, and wildlife and can provide opportunities for recreation.

Unless the very poorly drained to somewhat poorly drained soils in the county are artificially drained, the seasonal high water table or ponding can damage crops or delay planting. Most areas in the county can be used for corn, soybeans, or small grain because a drainage system has been installed. Measures that maintain the drainage system are needed. Additional drainage measures are needed in some areas. A system of surface ditches that includes mains and laterals is the most common drainage method in areas of the moderately slowly permeable to very slowly permeable soils in the uplands. Bluford, Cisne, Ebbert, Newberry, Shiloh, Bluford, and Wynoose soils are examples. If suitable outlets are available, subsurface tile drainage systems function satisfactorily in some areas of soils on bottom land, such as Petrolia, Shoals, and Wakeland soils.

Excessive amounts of sodium restrict the availability and uptake of some plant nutrients in Huey, Darmstadt, and Tamalco soils. Applications of gypsum may be needed to improve the fertility of these soils. Returning crop residue to the soil and regularly adding manure or other organic material improve fertility and tilth in the surface layer.

Tilth deteriorates as a result of erosion. As material from the subsoil is incorporated into the plow layer in eroded soils, the plow layer becomes more clayey. As a result, the rate of water infiltration decreases and the runoff rate and the susceptibility to erosion increase. Eroded and severely eroded soils are sticky when wet and hard and cloddy when dry. Examples are Atlas, Ava, Bluford, Darmstadt, and Hoyleton soils.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents *(3)*. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops *(12)*. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations or hazards that restrict their use.

Class II soils have moderate limitations or hazards that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations or hazards that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations or hazards that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations or hazards, impractical to remove, that limit their use.

Class VI soils have severe limitations or hazards that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations or hazards that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations or hazards that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations or hazards. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations or hazards that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

Much of Jasper County was originally covered by hardwood forests. Currently, however, only 18,000 acres, or 6 percent of the total acreage in the county, is woodland. Most of the original forest land was cleared, especially in areas suitable for cultivation. The largest areas of the remaining woodland are in the Bluford-Wynoose-Atlas, Thebes-Alvin, and Wakeland-Petrolia associations, which are described under the heading "General Soil Map Units." Much of the woodland is in areas that are too steep or too wet for cultivation. The soils in these areas are poorly suited, moderately suited, or well suited to trees of high quality.

Most of the woodland provides valuable watershed protection, wildlife habitat, and recreational areas. A small part of the acreage is managed as commercial woodland or for fruit production. Christmas trees are grown in a few areas. Important trees include white oak, red oak, shagbark hickory, elm, black walnut, and sugar maple in the uplands and silver maple, sycamore, pin oak, and cottonwood on flood plains.

Many of the stands can be improved by thinning or harvesting mature trees, removing undesirable species, preventing fires, excluding livestock, and controlling disease and insects.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *W*, excessive water in or on the soil; *C*, clay in the upper part of the soil; and *S*, sandy texture. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, W, C, and S.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage may occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, fire lanes, and log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment

generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment or season of use is not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used to rate the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough to give adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It is the dominant species on the soil and the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 8 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 8 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service or from a commercial nursery.

Recreation

The acreage in Jasper County used for recreational development has increased in recent years. Public lands that are available for recreation include the Newton Lake Fish and Wildlife Area and Sam Parr State Park. These areas are used for camping, hiking, bicycling, running, hunting, fishing, boating, picnicking,

and sightseeing. A few privately owned campgrounds have been developed in the county. Other facilities in the county include playgrounds, athletic fields, picnic areas, a golf course, and a swimming pool.

The potential for the development of additional recreational facilities is good throughout the county. Areas having the best potential are in the Bluford-Wynoose-Atlas and Thebes-Alvin associations, which are described under the heading "General Soil Map Units." These areas are characterized by nearly level to strongly sloping soils, wooded side slopes, and many streams.

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines (fig. 8). Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic (fig. 9). Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Thomas Micetich, district wildlife manager, Illinois Department of Conservation, helped prepare this section.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

Figure 8.—An area of Ava silt loam, 1 to 5 percent slopes, used as a campsite. This area is in Sam Parr State Park. Atlas soils are in the foreground.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, and grain sorghum.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture

Figure 9.—A picnic shelter on Ava silt loam, 1 to 5 percent slopes, in the Newton Lake Fish and Wildlife Area.

also are considerations. Examples of grasses and legumes are fescue, redtop, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, sunflower, thistle, and ragweed.

Hardwood trees and woody understory produce nuts and other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwoods and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, walnut, cherry, maple, apple, hawthorn, dogwood, hickory, blackberry, and raspberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian olive, autumn olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface

stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include owls, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

The soil associations described in the section "General Soil Map Units" occur as four wildlife areas.

Wildlife area 1 is the Cisne-Hoyleton-Darmstadt association. Much of this association was originally covered with prairie plants. The wildlife species that formerly thrived on these large expanses of grassland include the greater prairie chicken, bison, short-eared owl, Henslow's sparrow, and upland sandpiper.

Presently, most areas of this association are used for a rotation of corn and soybeans. A few small areas are used as pasture or woodland. Pastures and areas along edges of fields and along minor streams provide habitat for openland wildlife, including cottontail rabbit, quail, red fox, and a variety of songbirds.

The Jasper County Prairie Chicken Sanctuary is in an area of this association west of Newton. The goal in managing this sanctuary is to ensure the survival of one of the remaining populations of prairie chickens in Illinois. The prairie chicken, which at one time was abundant in Illinois, is a grassland grouse and a distant relative of the quail and pheasant. It requires large areas of undisturbed grassland for nesting and adequate food and cover. A hen prefers to nest in a grassy area that has an abundance of dried vegetation left over from the previous year. The area should provide cover that is open enough to allow easy movement and should have a good supply of insects, which are the primary food for the chicks. Redtop, timothy, and small grain should be included in the areas. Meadows of clover are not good nesting sites. Mowing should be delayed until July. Adequate cover should be maintained throughout the winter, when the diet of the prairie chickens consists mainly of waste grain and weed seeds *(8)*.

This association can be easily managed for wildlife because most of the habitat components are readily established. The seasonal high water table is the main management concern. Leaving crop residue on the surface throughout winter helps to control erosion and provides food for wildlife. Grassed areas, including terraces, grassed waterways, roadsides, and ditchbanks, should not be mowed until after the nesting season, which generally ends about July 15. Including warm-season species of grass, such as bluestem and switchgrass, in the pastured areas can increase the food supply in summer and improve the cover for openland wildlife. Livestock should be excluded from wooded areas by fences.

Wildlife area 2 is the Bluford-Wynoose-Atlas association. It borders the major streams in the county.

This wildlife area generally is used as cropland, pasture, or woodland. It provides habitat for a variety of wildlife species. The habitat is good, especially in the wooded areas. It can be improved by excluding livestock, planting fruit- and nut-bearing trees and shrubs, and leaving crop residue on the surface after harvest. Planting food plots of grain near the woodland, along fence rows, and in brushy draws ensures the availability of food for wildlife in winter (fig. 10). Establishing or maintaining fence rows provides travel lanes and some winter cover. Delaying the mowing of grassed areas, such as terraces, grassed waterways, roadsides, and ditches, until after the nesting season allows for the successful rearing of ground-nesting species, such as quail, rabbit, and a variety of songbirds.

Wildlife area 3 is the Thebes-Alvin association. It is used mainly for cultivated crops, pasture, or hay. The main management concerns in the areas used for row crops or pasture are soil blowing, water erosion, a low organic matter content, and a limited available water capacity.

Applying a system of conservation tillage, including grasses and legumes in the cropping system, and establishing and maintaining fence rows and windbreaks around fields improve the habitat for wildlife. The soils in this area are suited to native, warm-season prairie grasses, such as bluestem and switchgrass. Including these grasses in pastured areas can increase the food supply in summer and improve the cover for openland wildlife. The habitat for woodland wildlife can be improved by excluding livestock from wooded areas and by planting fruit- and nut-bearing trees and shrubs.

Wildlife area 4 is the Wakeland-Petrolia association. It is on flood plains. It is used mainly for cultivated crops. In places it is used for pasture, hay, or

woodland. Wetness and flooding are the main management concerns.

The soils in this area are moderately suited or well suited to habitat for woodland and wetland wildlife (fig. 11). Migrating waterfowl utilize unharvested or waste grain crops, winter wheat, and wild herbaceous plants. The wooded areas are well suited to habitat for squirrel, deer, quail, wood duck, and other woodland wildlife species. Excluding livestock from the wooded areas improves the habitat. The habitat for waterfowl can be improved by water-control structures, seasonal drawdown, proper management of native plants and domestic grain crops, and shallow water impoundments.

Figure 10.—Grain sorghum and corn planted for wildlife in an area of Bluford silt loam, 0 to 2 percent slopes, in Sam Parr State Park.

Figure 11.—An area of Petrolia silty clay loam, frequently flooded, which is well suited to habitat for wetland wildlife.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Estimates were made for erodibility, permeability, corrosivity, the shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreation uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, the shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. The depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), the shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of

sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 12 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, and flooding affect absorption of the effluent. Large stones interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness *(5)*.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil (fig. 12). Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during the wet and dry periods. Loamy or silty soils that

Figure 12.—A municipal sewage lagoon under construction in an area of Atlas and Ava soils near Willow Hill.

are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low

embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and the shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and depth to the water table is less than 1 foot. These soils may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in

construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability in the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to help to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 18.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the "Glossary."

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested is given in table 18.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in

the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated content of clay in each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓ bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and

high, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to reestablish after cultivation.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table

17, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs, on the average, once or less in 2 years; and *frequent* that is occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Engineering Index Test Data

Table 18 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are representative of the series described in the section "Soil Series and Their Morphology." The soil samples were tested by the Illinois Department of Transportation.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); and Moisture density, Method A—T 99 (AASHTO), D 698 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(13)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aqualf (*Aqu*, meaning water, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Albaqualfs (*Alb*, meaning white, plus *aqualf*, the suborder of the Alfisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Mollic* identifies the subgroup that has properties of both Alfisols and Mollisols. An example is Mollic Albaqualfs.

FAMILY. Families are established within a subgroup basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine, montmorillonitic, mesic Mollic Albaqualfs.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the underlying material can differ within a series. The Cisne series is an example. The typical pedon for the Cisne series in Illinois was sampled in Jasper County. It is the representative example of a fine, montmorillonitic, mesic Mollic Albaqualf on display at the International Soil Reference Information Center in Wageningen, Netherlands.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(11)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(13)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Alvin Series

The Alvin series consists of well drained, moderately permeable or moderately rapidly permeable soils on ridges and side slopes in the uplands. These soils formed in loamy and sandy eolian material. Slope ranges from 1 to 25 percent.

Alvin soils are similar to Hickory, Roby, and Thebes soils. Hickory soils formed in loamy glacial till on the steeper side slopes below the Alvin soils. The somewhat poorly drained Roby soils are on toe slopes below the Alvin soils. Thebes soils contain more clay in the upper part than the Alvin soils. They are in landscape positions similar to those of the Alvin soils.

Typical pedon of Alvin fine sandy loam, 1 to 5 percent slopes, 1,147 feet east and 810 feet south of the northwest corner of sec. 11, T. 8 N., R. 9 E.

Ap—0 to 7 inches; brown (10YR 4/3) fine sandy loam, pale brown (10YR 6/3) dry; few yellowish brown (10YR 5/4) peds in the lower part; moderate very fine granular and moderate fine subangular blocky structure; friable; many very fine and fine roots; common faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; medium acid; clear smooth boundary.

E—7 to 13 inches; yellowish brown (10YR 5/4) sandy loam; weak very thick platy structure parting to weak medium subangular blocky; friable; common fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; strongly acid; clear smooth boundary.

Bt1—13 to 24 inches; yellowish brown (10YR 5/6) fine sandy loam; moderate medium subangular blocky structure; friable; common fine roots; common distinct dark brown (7.5YR 4/4) and few faint yellowish brown (10YR 5/4) clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt2—24 to 34 inches; strong brown (7.5YR 5/6) sandy loam; weak coarse subangular blocky structure parting to moderate medium subangular blocky; friable; common very fine and few fine roots; few fine dark accumulations of iron and manganese oxide; strongly acid; gradual smooth boundary.

E&Bt—34 to 60 inches; strong brown (7.5YR 5/6) loamy sand (E) and strong brown (7.5YR 5/6) sandy loam (Bt); moderate medium subangular blocky structure in the E part and weak medium subangular blocky structure in the Bt part; friable in the E part and very friable in the Bt part; few very fine roots; few fine dark accumulations of iron and manganese oxide; strongly acid.

The thickness of the solum ranges from 38 to more than 60 inches. The Ap horizon has chroma of 3 or 4. It is dominantly fine sandy loam, but in some pedons it is loamy fine sand. The E horizon has hue of 10YR or 7.5YR and chroma of 4 to 6. Some pedons do not have an E horizon. The Bt horizon has value and chroma of 4 to 6. It is dominantly loam, sandy loam, or fine sandy loam, but some pedons have subhorizons of sandy clay loam or loamy sand. Some pedons do not have an E&Bt horizon.

Atlas Series

The Atlas series consists of somewhat poorly drained, very slowly permeable soils on side slopes along drainageways in the uplands. These soils formed in Illinoian glacial till that has a strongly developed paleosol. Slope ranges from 5 to 15 percent.

Typical pedon of Atlas silt loam, 5 to 10 percent slopes, eroded, 1,115 feet west and 2,355 feet north of the southeast corner of sec. 7, T. 6 N., R. 10 E.

Ap—0 to 6 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; common yellowish brown (10YR 5/4) peds; many very fine and fine roots; few till pebbles; neutral; abrupt smooth boundary.

Bt—6 to 16 inches; dark yellowish brown (10YR 4/4) silty clay loam; grayish brown (10YR 5/2) faces of peds; common fine distinct yellowish brown (10YR 5/6 and 5/8) mottles; moderate fine subangular blocky structure; firm; many fine and very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; common distinct pale brown (10YR 6/3) silt coatings on faces of peds; common till pebbles; very strongly acid; clear smooth boundary.

Btg1—16 to 23 inches; grayish brown (10YR 5/2) silty clay; many medium faint brown (10YR 5/3) and common medium distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; very firm; common very fine and fine roots; many distinct dark grayish brown (10YR 4/2) and common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; common distinct pale brown (10YR 6/3) silt coatings on faces of peds; common till pebbles; very strongly acid; clear smooth boundary.

Btg2—23 to 36 inches; grayish brown (10YR 5/2) silty clay; common medium distinct yellowish brown (10YR 5/6) and common medium prominent strong brown (7.5YR 5/8) mottles; moderate medium prismatic structure; very firm; common very fine and fine roots; many distinct dark grayish brown (10YR 4/2) and few distinct dark yellowish brown (10YR

4/4) clay films on faces of peds; few prominent light brownish gray (10YR 6/2) silt coatings on faces of peds; common fine to coarse dark accumulations of iron and manganese oxide; common till pebbles; strongly acid; gradual smooth boundary.

Btg3—36 to 45 inches; grayish brown (10YR 5/2) silty clay; many medium and coarse distinct yellowish brown (10YR 5/6) and many medium and coarse prominent strong brown (7.5YR 5/8) mottles; moderate coarse prismatic structure; very firm; common fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct dark brown (10YR 3/3) organic coatings in root channels; common fine to coarse dark accumulations of iron and manganese oxide; about 15 percent sand; common till pebbles; neutral; gradual smooth boundary.

Btg4—45 to 56 inches; light gray (10YR 6/1) clay loam; common coarse distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak coarse prismatic structure; firm; few very fine roots; few distinct grayish brown (10YR 5/2) clay films on faces of peds; many fine and medium dark accumulations of iron and manganese oxide; common till pebbles; neutral; gradual smooth boundary.

Btg5—56 to 60 inches; light gray (10YR 6/1) clay loam; many coarse distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak coarse prismatic structure; firm; few very fine roots; few distinct grayish brown (10YR 5/2) clay films on faces of peds; many fine and medium dark accumulations of iron and manganese oxide; common till pebbles; mildly alkaline.

The thickness of the solum ranges from 50 to more than 60 inches. In some pedons as much as 16 inches of loess overlies the glacial till.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. It is silt loam, silty clay loam, or clay loam. The Btg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 to 4.

Ava Series

The Ava series consists of moderately well drained soils on ridges and side slopes in the uplands. These soils are moderately permeable in the upper part, moderately slowly permeable in the next part, and very slowly permeable in the lower part. They formed in loess and in the underlying sediments at the surface of Illinoian till. They have a fragipan. Slope ranges from 1 to 10 percent.

Typical pedon of Ava silt loam, 1 to 5 percent slopes, 1,200 feet south and 500 feet west of the northeast corner of sec. 3, T. 8 N., R. 8 E.

A—0 to 5 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; very friable; many very fine, fine, and medium and few coarse roots; medium acid; abrupt smooth boundary.

E—5 to 9 inches; yellowish brown (10YR 5/4) silt loam; weak medium platy structure parting to moderate fine subangular blocky; friable; many very fine, fine, and medium and few coarse roots; common distinct brown (10YR 4/3) organic coatings on faces of peds; strongly acid; clear smooth boundary.

Bt1—9 to 16 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; common fine and medium and few coarse roots; many distinct brown (7.5YR 4/4) clay films on faces of peds; common distinct pale brown (10YR 6/3) silt coatings on faces of peds; strongly acid; clear smooth boundary.

Bt2—16 to 24 inches; strong brown (7.5YR 5/6) silty clay loam; common medium prominent light brownish gray (10YR 6/2) mottles in the lower part; moderate fine and medium subangular blocky structure; firm; common fine and few medium and coarse roots; many prominent brown (7.5YR 5/4) clay films on faces of peds; common distinct pale brown (10YR 6/3) silt coatings on faces of peds; very strongly acid; gradual wavy boundary.

B/E—24 to 27 inches; yellowish brown (10YR 5/4) silty clay loam (B); many medium prominent strong brown (7.5YR 5/8) mottles; moderate fine and medium subangular blocky structure; firm; many thick light brownish gray (10YR 6/2) silt coatings (E) on faces of peds; the E material occurs as fillings in spaces between peds; common fine and few coarse roots; very strongly acid; clear wavy boundary.

B′t—27 to 36 inches; yellowish brown (10YR 5/4) silty clay loam; many medium prominent strong brown (7.5YR 5/6 and 5/8) and common medium faint grayish brown (10YR 5/2) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; common fine and few medium and coarse roots; many distinct yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) clay films on faces of peds; common distinct light brownish gray (10YR 6/2) silt coatings on vertical faces of peds; very strongly acid; gradual wavy boundary.

Btx1—36 to 51 inches; yellowish brown (10YR 5/4) silt loam; common coarse distinct light brownish gray (10YR 6/2) and common medium prominent strong brown (7.5YR 5/6 and 5/8) mottles; strong very coarse prismatic structure; firm; brittle; few very fine

and fine roots, primarily in silt-filled cracks between peds; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; many prominent light brownish gray (10YR 6/2) silt coatings on vertical faces of peds; few fine dark accumulations of iron and manganese oxide; common pebbles; very strongly acid; gradual wavy boundary.

Btx2—51 to 60 inches; yellowish brown (10YR 5/4) silt loam; common coarse distinct grayish brown (10YR 5/2) and common coarse prominent strong brown (7.5YR 5/6 and 5/8) mottles; moderate very coarse prismatic structure; firm; brittle; few fine roots, primarily in silt-filled cracks between peds; common distinct brown (7.5YR 5/4) clay films on faces of peds; many prominent light brownish gray (10YR 6/2) silt coatings on vertical faces of peds; few fine dark accumulations of iron and manganese oxide; common pebbles; strongly acid.

The solum is more than 60 inches thick. The thickness of the loess ranges from 36 to 50 inches. Depth to the fragipan ranges from 31 to 40 inches.

The A or Ap horizon has value of 4 or 5. The E horizon has value of 4 or 5 and chroma of 4 to 6. Some pedons do not have an E horizon.

The Bt horizon has value of 5 or 6 and chroma of 4 to 6. It is silt loam or silty clay loam. Some pedons do not have a B/E horizon. The B′t horizon has value of 5 or 6 and chroma of 4 to 6. It is silty clay loam or clay loam. Some pedons do not have a B′t horizon. The Btx horizon has value of 5 or 6 and chroma of 2 to 6. It is silt loam, loam, or silty clay loam.

Bluford Series

The Bluford series consists of somewhat poorly drained, moderately slowly permeable and slowly permeable soils on broad ridges, on knolls, and on side slopes along drainageways in the uplands. These soils formed in loess and in the underlying sediments at the surface of Illinoian till. Slope ranges from 0 to 5 percent.

Bluford soils are similar to Hoyleton soils. When moist, Hoyleton soils have value of less than 4 in the Ap horizon. They are in landscape positions similar to those of the Bluford soils.

Typical pedon of Bluford silt loam, 0 to 2 percent slopes, 2,100 feet west and 2,000 feet north of the southeast corner of sec. 2, T. 8 N., R. 8 E.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, light brownish gray (10YR 6/2) dry; weak fine and medium granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

E—8 to 15 inches; brown (10YR 5/3) and pale brown (10YR 6/3) silt loam; few fine faint light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; weak medium platy structure; friable; few fine roots; few fine and medium dark concretions of iron and manganese oxide; medium acid; clear smooth boundary.

Bt—15 to 19 inches; pale brown (10YR 6/3) silty clay loam; few fine faint grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; moderate medium angular blocky structure; firm; few fine roots; many distinct grayish brown (10YR 5/2) clay films on faces of peds; many prominent light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine dark concretions of iron and manganese oxide; very strongly acid; clear smooth boundary.

Btg1—19 to 26 inches; light brownish gray (10YR 6/2) silty clay loam; many medium prominent strong brown (7.5YR 5/6) mottles; moderate medium angular blocky structure; firm; many distinct grayish brown (10YR 5/2) clay films on faces of peds; few fine dark concretions of iron and manganese oxide; very strongly acid; gradual smooth boundary.

Btg2—26 to 37 inches; light brownish gray (10YR 6/2) silty clay loam; common medium prominent strong brown (7.5YR 5/8) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; many distinct grayish brown (10YR 5/2) clay films on faces of peds; few medium dark stains of iron and manganese oxide; strongly acid; gradual smooth boundary.

2Btgx1—37 to 47 inches; light brownish gray (10YR 6/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to weak medium angular blocky; firm; slightly brittle; few distinct grayish brown (10YR 5/2) clay films on faces of peds; few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few medium dark concretions of iron and manganese oxide; few till pebbles; estimated 10 to 20 percent sand; strongly acid; gradual smooth boundary.

2Btgx2—47 to 54 inches; light brownish gray (10YR 6/2) silty clay loam; common medium distinct dark yellowish brown (10YR 4/6) mottles; weak medium prismatic structure parting to weak coarse angular blocky; firm; slightly brittle; very few distinct grayish brown (10YR 5/2) clay films on faces of peds; many fine dark concretions of iron and manganese oxide; few till pebbles; strongly acid; gradual smooth boundary.

2Cg—54 to 60 inches; grayish brown (10YR 5/2) silt loam; few medium distinct yellowish brown (10YR 5/6) mottles; massive; firm; many fine dark concretions of iron and manganese oxide; few till pebbles; slightly acid.

The thickness of the solum ranges from 50 to more than 60 inches. The thickness of the loess ranges from 35 to 45 inches.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The E horizon has value of 5 or 6 and chroma of 2 or 3. Some pedons do not have an E horizon. Some have a BE horizon.

The Bt and Btg horizons have value of 5 or 6 and chroma of 2 to 4. Some pedons have a 2Bt horizon. The 2Btgx horizon has value of 4 to 6 and chroma of 2 to 6. It is silty clay loam, clay loam, or silt loam.

Chelsea Series

The Chelsea series consists of excessively drained, rapidly permeable soils on ridges and side slopes in the uplands. These soils formed in sandy eolian material. Slope ranges from 7 to 18 percent.

Typical pedon of Chelsea loamy fine sand, 7 to 18 percent slopes, 2,498 feet south and 1,865 feet west of the northeast corner of sec. 21, T. 5 N., R. 14 W.

Ap—0 to 6 inches; dark yellowish brown (10YR 4/4) loamy fine sand, yellowish brown (10YR 5/4) dry; weak very fine and fine granular structure; very friable; many very fine and fine and few medium and coarse roots; medium acid; clear wavy boundary.

E—6 to 25 inches; yellowish brown (10YR 5/6) fine sand; single grain; loose; few very fine, fine, medium, and coarse roots; some pockets of brown (7.5YR 5/4) loamy sand; medium acid; diffuse wavy boundary.

E&Bt1—25 to 41 inches; brownish yellow (10YR 6/6) sand (E); single grain; loose; common wavy and discontinuous lamellae of brown (7.5YR 5/4) sandy loam ⅛ to ½ inch thick (Bt); weak fine and medium subangular blocky structure; friable; few very fine, fine, and medium roots; slightly acid; gradual smooth boundary.

E&Bt2—41 to 60 inches; brownish yellow (10YR 6/6) sand (E); single grain; loose; common continuous strong brown lamellae of (7.5YR 5/6) sandy loam ¼ to 1 inch thick (Bt); weak fine and medium subangular blocky structure; friable; few very fine and fine roots; slightly acid.

The thickness of the solum ranges from 54 to more than 60 inches. The Ap or A horizon has value of 3 or 4 and chroma of 2 to 4. It is loamy fine sand or fine sand. The E horizon has value of 4 or 5 and chroma of 3 to 6. The E part of the E&Bt horizon has value of 5 or 6 and chroma of 4 to 6. It is sand, fine sand, loamy fine sand, or loamy sand. The Bt part occurs as lamellae 1/16 inch to 2 inches thick. The lamellae have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. They are sandy loam, fine sandy loam, loamy fine sand, or loamy sand. Depth to the uppermost lamella ranges from 27 to 46 inches. The combined thickness of the lamellae to a depth of 60 inches is less than 6 inches.

Cisne Series

The Cisne series consists of poorly drained, very slowly permeable soils on broad flats in the uplands. These soils formed in loess and in the underlying sediments at the surface of Illinoian till. Slope ranges from 0 to 2 percent.

Cisne soils are similar to Hoyleton and Wynoose soils. Hoyleton soils are somewhat poorly drained and are on broad ridges above the Cisne soils. When moist, Wynoose soils have value of 4 or more in the Ap horizon. They are in landscape positions similar to those of the Cisne soils.

Typical pedon of Cisne silt loam, 1,960 feet west and 420 feet south of the northeast corner of sec. 3, T. 6 N., R. 9 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; few very dark gray (10YR 3/1) coatings on faces of peds; medium acid; abrupt smooth boundary.

E1—8 to 13 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/2) dry; common fine distinct yellowish brown (10YR 5/8) mottles; weak medium platy structure; friable; strongly acid; clear smooth boundary.

E2—13 to 17 inches; light gray (10YR 7/2) and light brownish gray (10YR 6/2) silt loam, white (10YR 8/2) dry; weak medium platy structure; friable; strongly acid; abrupt smooth boundary.

B/E—17 to 19 inches; gray (10YR 6/1) silty clay loam (B); common medium prominent yellowish red (5YR 4/6) mottles; moderate fine and medium angular blocky structure; friable; many prominent light gray (10YR 7/1 dry) silt coatings on faces of peds (E); strongly acid; clear smooth boundary.

Btg1—19 to 28 inches; grayish brown (10YR 5/2) silty clay loam; common medium prominent yellowish red (5YR 4/6) mottles; strong fine prismatic structure parting to strong fine and medium angular blocky; firm; many distinct gray (10YR 5/1) clay films on faces of peds; strongly acid; clear smooth boundary.

Btg2—28 to 37 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; moderate medium

angular blocky structure; firm; common distinct gray (10YR 5/1) clay films on faces of peds; strongly acid; clear smooth boundary.

2Btg3—37 to 43 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium and coarse prominent dark yellowish brown (10YR 4/4) mottles; weak coarse angular blocky structure; firm; few faint gray (10YR 5/1) clay films on faces of peds; about 15 percent sand; few pebbles; strongly acid; gradual smooth boundary.

2BCg—43 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam; common coarse prominent dark yellowish brown (10YR 4/4) mottles; weak coarse angular blocky structure; firm; about 15 percent sand, the content increasing with increasing depth; few pebbles; medium acid; gradual smooth boundary.

2Cg—60 to 70 inches; dark grayish brown (10YR 4/2) silt loam; many coarse prominent gray (N 6/0 and 7/0) mottles; massive; firm; about 20 percent sand; about 2 percent pebbles; few concretions of iron and manganese oxide; slightly acid.

The thickness of the solum ranges from 40 to more than 60 inches. The thickness of the loess ranges from 35 to 55 inches.

The Ap horizon has value of 2 or 3 and chroma of 1 to 3. The E horizon has value of 4 to 7 and chroma of 1 or 2. The Btg horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. It is silty clay loam or silty clay. Some pedons do not have a 2Btg horizon or a 2BCg horizon.

Darmstadt Series

The Darmstadt series consists of somewhat poorly drained, very slowly permeable soils on flats, broad ridges, and low knolls and on side slopes along drainageways in the uplands. These soils formed in loess and in the underlying sediments at the surface of Illinoian till. Slope ranges from 0 to 5 percent.

Darmstadt soils are similar to Huey and Tamalco soils. The poorly drained Huey soils are on broad flats below the Darmstadt soils. The moderately well drained Tamalco soils contain more clay in the Bt horizon than the Darmstadt soils. Also, they are on higher knolls.

Typical pedon of Darmstadt silt loam, 0 to 2 percent slopes, 855 feet west and 738 feet south of the northeast corner of sec. 6, T. 8 N., R. 9 E.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

E—9 to 15 inches; light brownish gray (10YR 6/2) silt loam; few fine distinct brownish yellow (10YR 6/6) and few fine faint pale brown (10YR 6/3) mottles; moderate fine subangular blocky structure; friable; few fine roots; many fine soft accumulations of iron and manganese oxide; few dark grayish brown (10YR 4/2) wormcasts; medium acid; abrupt smooth boundary.

Bt—15 to 26 inches; brown (10YR 5/3) silty clay; many medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak coarse and moderate medium subangular blocky structure; firm; few fine roots; many distinct grayish brown (10YR 5/2) clay films on faces of peds; many fine and medium soft accumulations of iron and manganese oxide; medium acid; clear smooth boundary.

Btg1—26 to 31 inches; grayish brown (10YR 5/2) silty clay loam; many medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; moderate medium prismatic structure; firm; few fine roots; many distinct grayish brown (2.5Y 5/2) clay films on faces of peds; many fine and medium soft accumulations of iron and manganese oxide; neutral; gradual smooth boundary.

Btg2—31 to 44 inches; grayish brown (10YR 5/2) silty clay loam; many medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak coarse and moderate medium prismatic structure; firm; few fine roots; common distinct grayish brown (2.5Y 5/2) clay films on faces of peds; many fine and medium soft accumulations of iron and manganese oxide; mildly alkaline; gradual smooth boundary.

2Btg3—44 to 53 inches; light brownish gray (10YR 6/2) silty clay loam; many medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak coarse prismatic structure; firm; few distinct grayish brown (10YR 5/2) clay films on faces of peds; many fine and medium soft accumulations of iron and manganese oxide; few till pebbles; moderately alkaline; gradual smooth boundary.

2Cg—53 to 60 inches; light brownish gray (10YR 6/2) silty clay loam; many medium distinct yellowish brown (10YR 5/6 and 5/8) and few medium distinct brownish yellow (10YR 6/8) mottles; massive; firm; few till pebbles; moderately alkaline.

The thickness of the solum ranges from 30 to 60 inches. The thickness of the loess ranges from 30 to 48 inches. Depth to the natric horizon ranges from 17 to 30 inches.

The Ap horizon has value of 3 or 4 and chroma of 2 or 3. The E horizon has value of 5 or 6. Some pedons do not have an E horizon.

The Bt and Btg horizons have value of 4 to 6 and

chroma of 2 or 3. They are silty clay loam, silty clay, or silt loam. The 2Btg horizon is silty clay loam, clay loam, or silt loam.

The 2Cg horizon has hue of 10YR or 2.5Y. It is silty clay loam or silt loam. In some pedons it has accumulations or concretions of calcium carbonate.

Darwin Series

The Darwin series consists of very poorly drained, very slowly permeable soils in swales on flood plains. These soils formed in clayey alluvium. Slope ranges from 0 to 2 percent.

Typical pedon of Darwin silty clay, frequently flooded, 385 feet west and 225 feet north of the southeast corner of sec. 8, T. 5 N., R. 14 W.

Ap—0 to 6 inches; very dark gray (10YR 3/1) silty clay, grayish brown (10YR 5/2) dry; weak fine granular structure in the upper part and moderate medium angular blocky structure in the lower part; firm; common fine and very fine roots; neutral; clear smooth boundary.

A—6 to 11 inches; very dark grayish brown (10YR 3/2) silty clay, grayish brown (10YR 5/2) dry; few fine distinct dark yellowish brown (10YR 4/4) mottles; moderate medium angular blocky structure; very firm; few fine and very fine roots; mildly alkaline; clear smooth boundary.

Bg1—11 to 28 inches; gray (10YR 5/1) silty clay; many fine and medium distinct dark yellowish brown (10YR 4/4) mottles; moderate medium prismatic structure; firm; few fine roots; shiny pressure faces; few fine soft accumulations of iron and manganese oxide; mildly alkaline; gradual smooth boundary.

Bg2—28 to 44 inches; gray (10YR 5/1) silty clay; many fine and medium distinct dark yellowish brown (10YR 4/4), few fine prominent strong brown (7.5YR 5/6), and few fine distinct yellowish brown (10YR 5/4) mottles; moderate coarse prismatic structure; firm; shiny pressure faces; few fine soft accumulations of iron and manganese oxide; neutral; gradual smooth boundary.

Bg3—44 to 60 inches; gray (10YR 5/1) silty clay; many fine and medium distinct dark yellowish brown (10YR 4/4), few fine prominent strong brown (7.5YR 5/6), and few fine distinct yellowish brown (10YR 5/4) mottles; weak coarse prismatic structure; firm; shiny pressure faces; few fine soft accumulations of iron and manganese oxide; neutral.

The thickness of the solum ranges from 40 to more than 60 inches. The thickness of the mollic epipedon ranges from 10 to 24 inches.

The Ap and A horizons have hue of 10YR or are neutral in hue. They have value of 2 or 3 and chroma of 0 to 2. The Bg horizon has hue of 10YR or 2.5Y or is neutral in hue. It has value of 3 to 6 and chroma of 0 to 2.

Ebbert Series

The Ebbert series consists of very poorly drained, slowly permeable soils in depressions in the uplands. These soils formed in loess. Slope ranges from 0 to 2 percent.

Ebbert soils are similar to Newberry and Racoon soils. The poorly drained Newberry and Racoon soils do not have a mollic epipedon. Newberry soils are on broad flats in the slightly higher areas. Racoon soils are on foot slopes, in depressions, and at the head of drainageways. The combined thickness of their A and E horizons is more than 24 inches.

Typical pedon of Ebbert silt loam, 550 feet east and 300 feet north of the southwest corner of sec. 18, T. 5 N., R. 11 E.

Ap—0 to 7 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular and moderate medium angular blocky structure; friable; many very fine and fine roots; slightly acid; abrupt smooth boundary.

A—7 to 12 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; many very fine and fine roots; medium acid; abrupt smooth boundary.

E—12 to 18 inches; grayish brown (10YR 5/2) silt loam; few fine distinct dark yellowish brown (10YR 4/6) mottles; weak fine subangular blocky structure; friable; many very fine and fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings in root channels; strongly acid; abrupt smooth boundary.

Btg1—18 to 31 inches; dark gray (10YR 4/1) silty clay loam; many fine and medium distinct dark yellowish brown (10YR 4/6) and prominent strong brown (7.5YR 5/6 and 5/8) mottles; moderate medium subangular blocky structure; firm; common very fine and fine roots; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine concretions of iron and manganese oxide; very strongly acid; clear smooth boundary.

Btg2—31 to 52 inches; grayish brown (10YR 5/2) silty clay loam; common fine and medium prominent strong brown (7.5YR 5/6 and 5/8) mottles; moderate medium prismatic structure; firm; common very fine

and fine roots; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine concretions of iron and manganese oxide; medium acid; clear smooth boundary.

2Cg—52 to 60 inches; grayish brown (10YR 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; massive; firm; few very fine roots; few fine concretions of iron and manganese oxide; 10 to 15 percent sand; slightly acid.

The thickness of the solum ranges from 45 to more than 60 inches. The thickness of the mollic epipedon ranges from 10 to 16 inches.

The Ap and A horizons have value of 2 or 3 and chroma of 1 or 2. The E horizon has value of 4 or 5 and chroma of 1 or 2. The Btg horizon has hue of 10YR or 2.5Y or is neutral in hue. It has value of 4 to 6 and chroma of 0 to 2. Some pedons have a BCg horizon. The 2Cg horizon has hue of 10YR, 2.5Y, or 5Y. It is silty clay loam or silt loam. Some pedons have a Cg horizon.

Gosport Series

The Gosport series consists of moderately deep, moderately well drained, very slowly permeable soils on side slopes along the major streams and drainageways in the uplands. These soils formed mainly in material weathered from shale. Slope ranges from 18 to 45 percent.

Typical pedon of Gosport silt loam, in an area of Hickory-Gosport complex, 18 to 30 percent slopes, 150 feet north and 1,350 feet west of the southeast corner of sec. 31, T. 8 N., R. 9 E.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; many very fine and fine roots; few pebbles and shale fragments; slightly acid; clear smooth boundary.

E—4 to 7 inches; yellowish brown (10YR 5/4) silt loam; weak fine subangular blocky structure; friable; many very fine and common fine roots; few pebbles and shale fragments; strongly acid; clear smooth boundary.

Bw1—7 to 13 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine subangular blocky structure; firm; common very fine roots; few faint pale brown (10YR 6/3) clay films on faces of peds; few shale fragments and till pebbles; very strongly acid; gradual smooth boundary.

Bw2—13 to 25 inches; yellowish brown (10YR 5/4) silty clay; common fine faint yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; common very fine and few fine and medium roots; common shale fragments; extremely acid; gradual smooth boundary.

Bw3—25 to 32 inches; yellowish brown (10YR 5/4) silty clay; few fine faint brown (10YR 5/3) and common medium faint yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; some medium platy rock structure; firm; common very fine and few fine and medium roots; common shale fragments; extremely acid; gradual smooth boundary.

Cr—32 to 60 inches; grayish brown (10YR 5/2), gray (N 5/0), and very dark gray (N 3/0) clay shale; medium to very thick platy rock structure; extremely firm; few fine and medium roots in bedding planes; strongly acid.

The thickness of the solum ranges from 20 to 35 inches and corresponds to the depth to bedrock. The A horizon has value of 3 or 4. It is silt loam or loam. The E horizon also is silt loam or loam. Some pedons do not have an E horizon. The Bw horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 or 4. The Cr horizon has hue of 5Y to 7.5YR or is neutral in hue. It has value of 3 to 6 and chroma of 0 to 6. It is silty clay or clay shale. It has thin beds of sandstone, lignite, and siltstone.

Haymond Series

The Haymond series consists of well drained, moderately permeable soils on flood plains. These soils formed in silty alluvium. Slope ranges from 0 to 2 percent.

Haymond soils are similar to Landes and Wakeland soils. Landes soils have a mollic epipedon and have more sand throughout than the Haymond soils. They are in landscape positions similar to those of the Haymond soils. The somewhat poorly drained Wakeland soils are slightly lower on the landscape than the Haymond soils.

Typical pedon of Haymond silt loam, frequently flooded, 1,700 feet east and 1,450 feet south of the northwest corner of sec. 32, T. 6 N., R. 14 W.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, brown (10YR 5/3) dry; moderate medium granular structure; friable; common very fine roots; common faint dark brown (10YR 3/3) organic coatings on faces of peds; neutral; abrupt smooth boundary.

Bw1—9 to 29 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine and medium subangular

blocky structure; friable; few very fine roots; medium acid; gradual smooth boundary.

Bw2—29 to 42 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; friable; few very fine roots; few faint brown (10YR 4/3) clay films in pores; medium acid; clear smooth boundary.

C—42 to 60 inches; stratified dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) fine sandy loam; massive; friable; medium acid.

The Bw and C horizons have value of 4 or 5 and chroma of 3 or 4. The C horizon is silt loam, very fine sandy loam, or fine sandy loam.

Hickory Series

The Hickory series consists of well drained, moderately permeable soils on side slopes along drainageways in the uplands. These soils formed in Illinoian glacial till. Slope ranges from 15 to 60 percent.

Hickory soils are similar to Alvin soils. Alvin soils formed in sandy and loamy eolian material and have less clay in the Bt horizon than the Hickory soils. They are on ridges and side slopes above the Hickory soils.

Typical pedon of Hickory loam, 15 to 30 percent slopes, 2,200 feet west and 2,300 feet north of the southeast corner of sec. 2, T. 8 N., R. 8 E.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; common fine roots; few till pebbles; few fine dark accumulations of iron and manganese oxide; slightly acid; clear smooth boundary.

E—3 to 8 inches; brown (10YR 4/3) loam; weak thin platy structure; friable; common fine roots; few till pebbles; few fine dark accumulations of iron and manganese oxide; medium acid; clear smooth boundary.

BE—8 to 15 inches; yellowish brown (10YR 5/4) loam; moderate medium subangular blocky structure; friable; common fine roots; common fine and medium concretions of iron and manganese oxide; common till pebbles; medium acid; gradual smooth boundary.

Bt1—15 to 26 inches; yellowish brown (10YR 5/4) clay loam; common fine distinct strong brown (7.5YR 5/6) and few fine faint pale brown (10YR 6/3) mottles; moderate medium angular blocky structure; firm; common fine roots; common distinct dark yellowish brown (10YR 4/6) clay films on faces of peds; common fine and medium concretions of iron and manganese oxide; common till pebbles; strongly acid; gradual smooth boundary.

Bt2—26 to 38 inches; yellowish brown (10YR 5/6) clay loam; few fine faint pale brown (10YR 6/3) and common fine faint yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; common fine roots; common faint brown (10YR 4/3) clay films on faces of peds; common fine and medium concretions of iron and manganese oxide; common till pebbles; very strongly acid; gradual smooth boundary.

Bt3—38 to 47 inches; yellowish brown (10YR 5/6) clay loam; common fine faint strong brown (7.5YR 5/6) and few fine faint pale brown (10YR 6/3) mottles; moderate medium angular blocky structure; firm; common medium roots; common faint brown (10YR 4/3) clay films on faces of peds; common fine and medium concretions of iron and manganese oxide; common till pebbles; slightly acid; gradual smooth boundary.

C—47 to 60 inches; yellowish brown (10YR 5/4) clay loam; common medium distinct strong brown (7.5YR 5/6) and few fine faint pale brown (10YR 6/3) mottles; massive; friable; few medium roots; common fine and medium concretions of iron and manganese oxide; common till pebbles; slight effervescence; mildly alkaline.

The thickness of the solum ranges from 42 to more than 60 inches. In some pedons as much as 20 inches of loess overlies the glacial till.

The A horizon has value of 3 or 4 and chroma of 2 or 3. Some pedons have an Ap horizon. This horizon has value of 4 or 5 and chroma of 2 to 4. It is loam, clay loam, or silt loam. The E horizon has value of 4 or 5 and chroma of 3 or 4. Some pedons do not have an E horizon.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is clay loam, loam, or silty clay loam. Some pedons have a BC horizon.

Hoyleton Series

The Hoyleton series consists of somewhat poorly drained, slowly permeable soils on broad ridges and knolls and on side slopes along drainageways in the uplands. These soils formed in loess and in the underlying sediments at the surface of Illinoian till. Slope ranges from 1 to 5 percent.

Hoyleton soils are similar to Bluford and Cisne soils. When moist, Bluford soils have value of 4 or more in the Ap horizon. They are in landscape positions similar to those of the Hoyleton soils. The poorly drained Cisne soils are on broad flats below the Hoyleton soils. They

are characterized by an abrupt textural change between the E and the Bt horizons.

Typical pedon of Hoyleton silt loam, 1 to 3 percent slopes, 905 feet south and 912 feet west of the northeast corner of sec. 34, T. 6 N., R. 9 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; very friable; many very fine and fine roots; slightly acid; abrupt smooth boundary.

E—8 to 15 inches; brown (10YR 5/3) silt loam; moderate fine subangular blocky structure; friable; common very fine and fine roots; prominent reddish brown (5YR 4/4) iron stains in root channels; very strongly acid; clear smooth boundary.

Bt1—15 to 24 inches; brown (10YR 5/3) silty clay loam; many medium prominent red (2.5YR 4/8) and many medium prominent strong brown (7.5YR 5/8) mottles; moderate medium angular and subangular blocky structure; firm; common very fine and fine roots; many distinct grayish brown (10YR 5/2) clay films on faces of peds; common distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; common distinct dark gray (10YR 4/1) organic coatings on vertical faces of peds; few fine dark accumulations of iron and manganese oxide; very strongly acid; clear smooth boundary.

Bt2—24 to 34 inches; yellowish brown (10YR 5/4) silty clay loam; many medium prominent strong brown (7.5YR 5/8), common fine prominent yellowish red (5YR 5/8), and common medium distinct light brownish gray (10YR 6/2) mottles; moderate coarse prismatic structure parting to moderate coarse subangular blocky; firm; few very fine roots, primarily between peds; many distinct grayish brown (10YR 5/2) clay films on faces of peds; few medium dark accumulations of iron and manganese oxide; strongly acid; clear smooth boundary.

2Bt3—34 to 46 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct light brownish gray (10YR 6/2) and many medium distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure; firm; common distinct light brownish gray (10YR 6/2) clay films on faces of peds; common distinct pale brown (10YR 6/3 dry) silt coatings on faces of peds; common medium dark accumulations of iron and manganese oxide; few pebbles; strongly acid; gradual wavy boundary.

2BC—46 to 60 inches; yellowish brown (10YR 5/4) silt loam; many medium distinct yellowish brown (10YR 5/6 and 5/8) and light brownish gray (10YR 6/2) mottles; weak coarse prismatic structure; firm; few faint grayish brown (10YR 5/2) clay films on faces of peds; common medium dark accumulations of iron and manganese oxide; few pebbles; slightly acid.

The thickness of the solum ranges from 48 to more than 60 inches. The thickness of the loess ranges from 34 to 50 inches.

The Ap horizon has value and chroma of 2 or 3. The E horizon has value of 4 or 5 and chroma of 3 or 4. Some pedons do not have an E horizon.

The Bt horizon has value of 5 or 6 and chroma of 2 to 4. It is dominantly silty clay loam, but some pedons have subhorizons of silty clay or silt loam. The 2BC horizon has value of 4 to 6 and chroma of 1 to 4. Some pedons do not have a 2BC horizon. Some have a 2C horizon within a depth of 60 inches. This horizon is clay loam.

Huey Series

The Huey series consists of poorly drained, very slowly permeable soils on broad flats in the uplands. These soils formed in loess and in the underlying sediments at the surface of Illinoian till. Slope ranges from 0 to 2 percent.

Huey soils are similar to Darmstadt soils. Darmstadt soils are somewhat poorly drained and are on low knolls and ridges above the Huey soils.

Typical pedon of Huey silt loam, 495 feet south and 1,565 feet west of the center of sec. 12, T. 8 N., R. 8 E.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; common fine and very fine roots; few fine dark accumulations of iron and manganese oxide; slightly acid; abrupt smooth boundary.

E—9 to 15 inches; light brownish gray (10YR 6/2) silt loam; dark grayish brown (10YR 4/2) faces of peds; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium platy structure parting to moderate fine granular; friable; few fine and very fine roots; few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine dark accumulations of iron and manganese oxide; medium acid; clear smooth boundary.

Btg1—15 to 21 inches; grayish brown (10YR 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure parting to weak fine subangular blocky; firm; few fine roots; few faint dark gray (10YR 4/1) clay films on faces of peds; few faint pale brown (10YR 6/3 dry) silt coatings on faces of peds; few fine dark accumulations of iron and

manganese oxide; mildly alkaline; gradual smooth boundary.

Btg2—21 to 36 inches; grayish brown (10YR 5/2) silty clay loam; many medium prominent strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; common distinct gray (10YR 5/1) clay films, common distinct dark grayish brown (10YR 4/2) organic coatings, and few distinct light brownish gray (10YR 6/2 dry) silt coatings on faces of peds; few fine and medium dark accumulations of iron and manganese oxide; moderately alkaline; gradual smooth boundary.

Btg3—36 to 45 inches; grayish brown (10YR 5/2) silty clay loam; many coarse prominent strong brown (7.5YR 5/6 and 5/8) mottles; weak coarse prismatic structure parting to moderate medium prismatic; firm; common distinct gray (10YR 5/1) clay films on faces of peds; common distinct dark gray (10YR 4/1) organic coatings in root pores; common fine and medium dark accumulations of iron and manganese oxide; moderately alkaline; gradual smooth boundary.

2Btg4—45 to 53 inches; gray (10YR 5/1) silty clay loam; many coarse distinct yellowish brown (10YR 5/6 and 5/8) mottles; moderate medium prismatic structure; firm; common distinct grayish brown (10YR 5/2) clay films on faces of peds; common distinct dark gray (10YR 4/1) organic coatings in root pores; common fine and medium dark accumulations of iron and manganese oxide; estimated 15 to 20 percent sand; few till pebbles; moderately alkaline; gradual smooth boundary.

2BCg—53 to 60 inches; light gray (10YR 6/1) silty clay loam; many coarse prominent strong brown (7.5YR 5/6 and 5/8) mottles; weak coarse prismatic structure; firm; many medium dark accumulations of iron and manganese oxide; estimated 15 to 20 percent sand; few till pebbles; moderately alkaline.

The thickness of the solum ranges from 50 to more than 60 inches. The thickness of the loess ranges from 36 to 50 inches. Depth to the natric horizon ranges from 12 to 20 inches.

The Ap horizon has value of 4 or 5 and chroma of 1 or 2. The E horizon has value of 5 or 6. Some pedons have an EB horizon. The Btg horizon has hue of 10YR or 2.5Y and value of 4 to 6. In some pedons it has accumulations or concretions of calcium carbonate. Some pedons do not have a 2BCg horizon.

Landes Series

The Landes series consists of well drained soils on narrow swells and slight rises on flood plains. These soils are moderately rapidly permeable in the upper part and rapidly permeable in the lower part. They formed in loamy and sandy alluvium. Slope ranges from 0 to 2 percent.

Landes soils are similar to Haymond soils. Haymond soils do not have a mollic epipedon and have less sand and more silt than the Landes soils. They are in landscape positions similar to those of the Landes soils.

Typical pedon of Landes fine sandy loam, frequently flooded, 1,570 feet north and 2,535 feet east of the southwest corner of sec. 30, T. 6 N., R. 14 W.

Ap—0 to 7 inches; dark brown (10YR 3/3) fine sandy loam, brown (10YR 5/3) dry; moderate very fine and fine granular structure; friable; common very fine and fine roots; slightly acid; abrupt smooth boundary.

A—7 to 12 inches; dark brown (10YR 3/3) fine sandy loam, brown (10YR 5/3) dry; moderate fine granular structure; friable; common very fine and fine roots; slightly acid; clear smooth boundary.

Bw1—12 to 23 inches; dark yellowish brown (10YR 4/4) loamy fine sand; weak fine subangular blocky structure; very friable; few very fine roots; common distinct brown (10YR 4/3) organic coatings on faces of peds; dark brown (10YR 3/3) wormcasts; slightly acid; clear smooth boundary.

Bw2—23 to 35 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine and medium subangular blocky structure; friable; few very fine and fine roots; common distinct brown (10YR 4/3) organic coatings on faces of peds; dark brown (10YR 3/3) wormcasts; slightly acid; clear smooth boundary.

C1—35 to 41 inches; dark yellowish brown (10YR 4/4) fine sandy loam; massive; very friable; few very fine roots; slightly acid; clear smooth boundary.

C2—41 to 60 inches; yellowish brown (10YR 5/4) loamy sand that has strata of dark yellowish brown (10YR 4/4) sandy loam; single grain; loose; neutral.

The thickness of the solum ranges from 22 to 40 inches. The thickness of the mollic epipedon ranges from 10 to 16 inches.

The Ap and A horizons have chroma of 2 or 3. They are fine sandy loam or loam. The Bw horizon has value of 4 or 5 and chroma of 3 or 4. It is dominantly loamy fine sand, fine sandy loam, or very fine sandy loam but has thin subhorizons or strata of loam in some pedons. The C horizon typically is stratified sandy loam, loamy sand, fine sandy loam, very fine sand, or very fine sandy loam.

Newberry Series

The Newberry series consists of poorly drained, slowly permeable soils on broad flats in the uplands.

These soils formed in loess and in the underlying sediments at the surface of Illinoian till. Slope ranges from 0 to 2 percent.

Newberry soils are similar to Ebbert and Racoon soils. The very poorly drained Ebbert soils have a mollic epipedon and are in depressions slightly below the Newberry soils. Racoon soils have a surface layer that is lighter colored than that of the Newberry soils. They are on foot slopes and in depressions below the Newberry soils.

Typical pedon of Newberry silt loam, 790 feet east and 450 feet south of the northwest corner of sec. 5, T. 8 N., R. 8 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; very friable; common fine and very fine roots; neutral; abrupt smooth boundary.

E—8 to 14 inches; dark grayish brown (10YR 4/2) silt loam; common medium distinct dark yellowish brown (10YR 4/6) mottles; weak thin platy structure parting to moderate very fine subangular blocky; friable; common very fine and few fine roots; common distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine accumulations of iron and manganese oxide; very strongly acid; clear smooth boundary.

Btg1—14 to 27 inches; grayish brown (10YR 5/2) silty clay loam; few medium prominent strong brown (7.5YR 5/8) and common medium distinct dark yellowish brown (10YR 4/6) mottles; moderate fine subangular blocky structure; firm; common very fine and few fine roots; few distinct dark grayish brown (10YR 4/2) clay films and light gray (10YR 7/2 dry) silt coatings on faces of peds; common fine and medium concretions of iron and manganese oxide; very strongly acid; clear smooth boundary.

Btg2—27 to 47 inches; grayish brown (10YR 5/2) silty clay loam; common coarse and medium prominent strong brown (7.5YR 5/6) and common coarse and medium distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine and very fine roots; common distinct dark gray (10YR 4/1) clay films on faces of peds; few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; common fine and medium concretions of iron and manganese oxide; very strongly acid; gradual smooth boundary.

2Btg3—47 to 55 inches; gray (10YR 5/1) silty clay loam; many coarse and medium distinct dark yellowish brown (10YR 4/6) and yellowish brown (10YR 5/4 and 5/6) mottles; weak coarse prismatic structure; firm; few faint dark gray (10YR 4/1) clay films on faces of peds; common medium accumulations and common medium and coarse concretions of iron and manganese oxide; few till pebbles; estimated about 10 percent sand; strongly acid; gradual wavy boundary.

2Cg—55 to 60 inches; gray (10YR 5/1) silty clay loam; common coarse distinct yellowish brown (10YR 5/6) mottles; massive; firm; common medium accumulations and stains of iron and manganese oxide; few till pebbles; estimated 10 to 15 percent sand; medium acid.

The thickness of the solum ranges from 45 to more than 60 inches. The thickness of the loess ranges from 38 to 55 inches.

The Ap horizon has value of 2 or 3 and chroma of 1 or 2. The E horizon has value of 4 or 5 and chroma of 1 or 2. The Btg horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. Some pedons have a 2BCg horizon.

Petrolia Series

The Petrolia series consists of poorly drained, moderately slowly permeable soils in broad, low areas on flood plains. These soils formed in silty alluvium. Slope ranges from 0 to 2 percent.

Typical pedon of Petrolia silty clay loam, rarely flooded, 290 feet east and 1,150 feet north of the southwest corner of sec. 31, T. 6 N., R. 14 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silty clay loam, light brownish gray (10YR 6/2) dry; weak very fine and fine subangular blocky structure; friable; few very fine roots; slightly acid; abrupt smooth boundary.

Cg1—8 to 16 inches; dark gray (10YR 4/1) silty clay loam; few fine distinct yellowish brown (10YR 5/4) mottles; weak fine subangular blocky structure; friable; few very fine roots; few fine soft accumulations and nodules of iron and manganese oxide; neutral; clear smooth boundary.

Cg2—16 to 23 inches; gray (10YR 5/1) silty clay loam; common medium prominent yellowish brown (10YR 5/4 and 5/6) and faint grayish brown (10YR 5/2) mottles; weak fine and medium subangular blocky structure; friable; few very fine roots; few faint dark grayish brown (10YR 4/2) faces of peds; common fine soft accumulations and nodules of iron and manganese oxide; neutral; clear smooth boundary.

Cg3—23 to 35 inches; gray (10YR 5/1) silty clay loam; few fine faint brown (10YR 5/3) and grayish brown (10YR 5/2) and common medium prominent

yellowish brown (10YR 5/6 and 5/8) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; few very fine roots; few fine dark grayish brown (10YR 4/2) faces of peds; common fine and medium soft accumulations and nodules of iron and manganese oxide; neutral; gradual smooth boundary.

Cg4—35 to 60 inches; gray (10YR 5/1) silty clay loam; many medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; weak fine subangular blocky structure; friable; many fine and medium soft accumulations and common fine and medium nodules of iron and manganese oxide; neutral.

The Ap or A horizon generally has value of 4 or 5 and chroma of 1 or 2, but some pedons have a thin surface layer with value of 3. The Cg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It has thin strata of silt loam, loam, or clay loam in some pedons.

Racoon Series

The Racoon series consists of poorly drained, slowly permeable soils in depressions or at the head of drainageways in the uplands and on foot slopes or low stream terraces at the base of river bluffs. These soils formed in loess or in silty local alluvium. Slope ranges from 0 to 2 percent.

Racoon soils are similar to Ebbert, Newberry, and Ruark soils. The very poorly drained Ebbert soils have a mollic epipedon and are in depressions on broad flats in the uplands. Newberry soils have a dark surface layer and are on broad flats in the uplands. Ruark soils are fine-loamy and are in landscape positions similar to those of the Racoon soils.

Typical pedon of Racoon silt loam, 43 feet south and 1,435 feet east of the northwest corner of sec. 5, T. 7 N., R. 8 E.

Ap—0 to 6 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/2) dry; moderate fine and medium granular structure; very friable; common very fine and fine roots; few fine concretions and stains of iron and manganese oxide; slightly acid; abrupt smooth boundary.

E1—6 to 19 inches; light brownish gray (10YR 6/2) silt loam; common fine prominent strong brown (7.5YR 5/8) mottles; weak medium and thin platy structure; very friable; common very fine and fine roots; few distinct light gray (10YR 7/1 dry) silt coatings on faces of peds; few faint grayish brown (10YR 5/2) organic coatings on faces of peds; common medium concretions of iron and manganese oxide; very strongly acid; clear smooth boundary.

E2—19 to 27 inches; light brownish gray (10YR 6/2) silt loam; common fine prominent strong brown (7.5YR 5/6 and 5/8) mottles; weak medium platy structure parting to weak very fine subangular blocky; very friable; common very fine and fine roots; common distinct light gray (10YR 7/1 dry) silt coatings on faces of peds; common fine and medium concretions of iron and manganese oxide; extremely acid; clear smooth boundary.

Btg1—27 to 32 inches; light brownish gray (10YR 6/2) silty clay loam; common fine prominent strong brown (7.5YR 5/8) mottles; weak fine and medium subangular blocky structure; friable; few fine roots; common distinct light gray (10YR 7/1 dry) silt coatings on faces of peds; common faint grayish brown (10YR 5/2) clay films on faces of peds; common fine and medium concretions of iron and manganese oxide; extremely acid; clear smooth boundary.

Btg2—32 to 43 inches; light brownish gray (10YR 6/2) silty clay loam; common fine prominent strong brown (7.5YR 5/6) mottles; moderate coarse prismatic structure parting to weak medium subangular blocky; firm; few fine roots; common distinct grayish brown (10YR 5/2) clay films on faces of peds; few distinct light gray (10YR 7/1 dry) silt coatings on faces of peds; common fine and medium concretions of iron and manganese oxide; extremely acid; gradual wavy boundary.

Btg3—43 to 60 inches; grayish brown (10YR 5/2) silty clay loam; few fine prominent strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure; firm; few fine roots; many faint gray (10YR 5/1) clay films on faces of peds; few fine concretions of iron and manganese oxide; extremely acid.

The thickness of the solum ranges from 40 to more than 60 inches. The combined thickness of the A and E horizons ranges from 24 to 32 inches.

The Ap horizon has value of 4 or 5. The E horizon has value of 5 or 6 and chroma of 1 or 2. The Btg horizon has hue of 10YR or 2.5Y and chroma of 1 or 2.

Richview Series

The Richview series consists of moderately well drained, moderately permeable soils on convex ridgetops, the crest of loess-covered hills, the sides of ridges, and side slopes along drainageways in the uplands. These soils formed in loess and in the underlying sediments at the surface of Illinoian till. Slope ranges from 2 to 10 percent.

Typical pedon of Richview silt loam, 2 to 5 percent

slopes, 2,480 feet west and 2,100 feet south of the northeast corner of sec. 25, T. 6 N., R. 10 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; many fine and very fine roots; few fine soft accumulations of iron and manganese oxide; neutral; clear smooth boundary.

E—8 to 12 inches; brown (10YR 5/3) silt loam; few fine prominent distinct strong brown (7.5YR 5/6) mottles; moderate thin platy structure; friable; common fine and very fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine soft accumulations of iron and manganese oxide; strongly acid; clear smooth boundary.

Bt1—12 to 19 inches; yellowish brown (10YR 5/4) silty clay loam; many fine and medium prominent yellowish red (5YR 4/6) mottles; strong fine angular blocky structure; firm; few fine roots; common faint brown (10YR 5/3) clay films on faces of peds; many distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine soft accumulations of iron and manganese oxide; very strongly acid; clear smooth boundary.

Bt2—19 to 24 inches; yellowish brown (10YR 5/4) silty clay loam; many fine and medium prominent yellowish red (5YR 4/6) and faint yellowish brown (10YR 5/6) mottles; strong fine prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common faint brown (10YR 5/3) clay films, many distinct very dark gray (10YR 3/1) organic coatings, and few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine soft accumulations of iron and manganese oxide; very strongly acid; gradual smooth boundary.

Bt3—24 to 38 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct brown (10YR 5/3) and common fine distinct light brownish gray (10YR 6/2) mottles; moderate coarse prismatic structure; firm; few distinct brown (10YR 4/3) clay films on faces of peds; common distinct strong brown (7.5YR 5/6) stains of iron and manganese oxide on faces of peds; few fine soft accumulations of iron and manganese oxide; medium acid; gradual smooth boundary.

2BC—38 to 46 inches; yellowish brown (10YR 5/6) silt loam; common fine distinct light brownish gray (10YR 6/2), common medium distinct brown (10YR 5/3), and few fine distinct dark yellowish brown (10YR 4/4) mottles; weak coarse prismatic structure; firm; common distinct strong brown (7.5YR 5/6) stains of iron and manganese oxide on faces of peds; few fine soft accumulations of iron and manganese oxide; medium acid; gradual smooth boundary.

2C—46 to 60 inches; yellowish brown (10YR 5/6) silt loam; common fine distinct light brownish gray (10YR 6/2), common medium distinct brown (10YR 5/3), and common fine distinct dark yellowish brown (10YR 4/4) mottles; massive; firm; few fine soft accumulations of iron and manganese oxide; slightly acid.

The thickness of the solum ranges from 42 to more than 60 inches. The thickness of the loess ranges from 35 to 60 inches.

The Ap horizon has value and chroma of 2 or 3. The E horizon has value of 4 or 5 and chroma of 2 or 3. Some pedons do not have an E horizon.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. The 2BC horizon is loam, silt loam, or clay loam. Some pedons have a 2Bt horizon instead of or in addition to a 2BC horizon. The 2C horizon is silt loam, loam, or clay loam.

Roby Series

The Roby series consists of somewhat poorly drained soils in nearly level areas on toe slopes in the uplands and on low stream terraces at the base of river bluffs. These soils are moderately permeable in the upper part and moderately rapidly permeable in the lower part. They formed in loamy and sandy sediments. Slope ranges from 0 to 2 percent.

Roby soils are similar to Alvin soils. Alvin soils are well drained and are on ridges and side slopes above the Roby soils.

Typical pedon of Roby fine sandy loam, 132 feet south and 66 feet east of the northwest corner of sec. 22, T. 6 N., R. 14 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) fine sandy loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; very friable; common very fine roots; common faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; abrupt smooth boundary.

E—9 to 15 inches; yellowish brown (10YR 5/4) loamy fine sand; weak fine granular structure; very friable; few faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; medium acid; clear smooth boundary.

Bt—15 to 23 inches; yellowish brown (10YR 5/4) sandy loam; few fine faint brown (10YR 5/3) and few fine distinct grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; very friable; common faint clay films or bridges on or between

sand grains; few fine yellowish red (5YR 5/6) stains of iron and manganese oxide on faces of peds; slightly acid; clear smooth boundary.

BC—23 to 46 inches; yellowish brown (10YR 5/4) loamy sand; few fine faint yellowish brown (10YR 5/6) and common medium distinct grayish brown (10YR 5/2) mottles; weak fine subangular blocky structure; very friable; few faint clay films or bridges on or between sand grains; common medium and coarse yellowish red (5YR 5/6) stains of iron and manganese oxide on faces of peds; neutral; clear smooth boundary.

C—46 to 60 inches; light brownish gray (10YR 6/2) sand; common medium distinct yellowish brown (10YR 5/6) mottles; single grain; loose; neutral.

The thickness of the solum ranges from 30 to 60 inches. The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The E horizon has value of 4 to 6 and chroma of 3 or 4. The Bt horizon has value of 4 or 5 and chroma of 2 to 6. It is dominantly fine sandy loam, sandy loam, or loam, but some pedons have thin subhorizons of clay loam or sandy clay loam. The BC horizon is fine sandy loam, sandy loam, or loamy sand. Some pedons do not have a BC horizon. The C horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 8.

Ruark Series

The Ruark series consists of poorly drained, moderately slowly permeable soils on broad flats and in depressions in the uplands and on low terraces adjacent to bluffs in major stream valleys. These soils formed in loamy sediments. Slope ranges from 0 to 2 percent.

Ruark soils are similar to Racoon soils. Racoon soils are fine-silty and are in landscape positions similar to those of the Ruark soils.

Typical pedon of Ruark fine sandy loam, 400 feet south and 460 feet west of the northeast corner of sec. 25, T. 7 N., R. 9 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) fine sandy loam, light brownish gray (10YR 6/2) dry; few fine distinct dark yellowish brown (10YR 4/6) mottles; weak fine and medium granular structure; very friable; common very fine and fine roots; few fine dark soft accumulations of iron and manganese oxide; neutral; abrupt smooth boundary.

E—7 to 13 inches; light brownish gray (10YR 6/2) fine sandy loam; common medium distinct dark yellowish brown (10YR 4/6) and yellowish brown (10YR 5/6 and 5/8) mottles; weak fine subangular blocky structure; very friable; common very fine and fine roots; few distinct dark grayish brown (10YR 4/2) organic coatings on faces of peds; few fine and medium dark soft accumulations of iron and manganese oxide; neutral; clear smooth boundary.

Btg1—13 to 17 inches; light brownish gray (10YR 6/2) loam; common medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; moderate fine subangular blocky structure; friable; few very fine roots; few faint grayish brown (10YR 5/2) clay films on faces of peds; few fine and medium dark soft accumulations of iron and manganese oxide; neutral; clear smooth boundary.

Btg2—17 to 30 inches; light brownish gray (10YR 6/2) clay loam; common coarse distinct yellowish brown (10YR 5/6 and 5/8) and few fine prominent strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; few very fine roots; common faint grayish brown (10YR 5/2) clay films on faces of peds; common fine and medium dark soft accumulations of iron and manganese oxide; neutral; gradual smooth boundary.

Btg3—30 to 46 inches; light brownish gray (10YR 6/2) clay loam; few thin strata of loam; common coarse distinct yellowish brown (10YR 5/6 and 5/8) and common medium prominent strong brown (7.5YR 5/8) mottles; weak coarse subangular blocky structure parting to moderate medium subangular blocky; firm; few very fine roots; common distinct grayish brown (10YR 5/2) clay films on faces of peds; common fine and medium soft dark accumulations and few medium dark concretions of iron and manganese oxide; neutral; gradual smooth boundary.

Cg—46 to 60 inches; grayish brown (10YR 5/2) sandy loam; common thin strata of loam and sandy clay loam; common coarse distinct yellowish brown (10YR 5/6 and 5/8) mottles; massive; friable; few faint gray (10YR 5/1) coatings on cleavage planes; common fine and medium dark soft accumulations and few medium dark concretions of iron and manganese oxide; neutral.

The thickness of the solum ranges from 30 to 50 inches. The Ap horizon has value of 4 or 5 and chroma of 1 or 2. The E horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. The Btg and Cg horizons have hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. The Btg horizon is loam, sandy clay loam, or clay loam. The Cg horizon is sandy loam, fine sandy loam, sandy clay loam, loam, loamy sand, clay loam, or silt loam.

Shiloh Series

The Shiloh series consists of very poorly drained, moderately slowly permeable soils in depressions on broad flats in the uplands. These soils formed in loess or silty sediments. Slope ranges from 0 to 2 percent.

Typical pedon of Shiloh silty clay loam, 485 feet south and 2,258 feet east of the northwest corner of sec. 23, T. 8 N., R. 8 E.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silty clay loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; firm; common fine and very fine roots; neutral; abrupt smooth boundary.

A—8 to 16 inches; very dark gray (10YR 3/1) silty clay loam, grayish brown (10YR 5/2) dry; common fine distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak fine subangular blocky structure parting to moderate very fine subangular blocky; firm; common fine and very fine roots; neutral; clear smooth boundary.

Bg1—16 to 29 inches; very dark gray (10YR 3/1) silty clay, grayish brown (10YR 5/2) dry; common fine and medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; moderate fine subangular blocky structure; firm; common fine and very fine roots; few distinct shiny faces of peds; few faint black (10YR 2/1) organic coatings on faces of peds; neutral; clear smooth boundary.

Bg2—29 to 35 inches; very dark gray (10YR 3/1) silty clay, grayish brown (10YR 5/2) dry; few fine distinct yellowish brown (10YR 5/4) and common coarse distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure; firm; few fine and very fine roots; few distinct shiny faces of peds; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; gradual smooth boundary.

Bg3—35 to 46 inches; dark gray (10YR 4/1) silty clay; common coarse distinct yellowish brown (10YR 5/6) and few fine distinct yellowish brown (10YR 5/4) mottles; moderate medium prismatic structure; firm; few very fine roots; few distinct shiny faces of peds; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; very dark gray (10YR 3/1) krotovina material; neutral; gradual smooth boundary.

Bg4—46 to 59 inches; dark gray (10YR 4/1) silty clay loam; many coarse distinct yellowish brown (10YR 5/6 and 5/8) and common medium faint grayish brown (10YR 5/2) mottles; moderate coarse prismatic structure; firm; few very fine roots; few distinct shiny faces of peds; few distinct very dark gray (10YR 3/1) organic coatings on faces of peds; black (10YR 2/1) krotovina material; neutral; gradual smooth boundary.

Cg—59 to 65 inches; gray (10YR 5/1) silty clay loam; many coarse distinct yellowish brown (10YR 5/6 and 5/8) and common medium distinct grayish brown (2.5Y 5/2) mottles; massive; firm; very dark gray (10YR 3/1) krotovina material; few till pebbles; neutral.

The thickness of the solum ranges from 36 to 62 inches. The mollic epipedon ranges from 24 to 36 inches in thickness.

The Ap and A horizons have value of 2 or 3 and chroma of 2 or less. The Bg horizon has hue of 10YR or 2.5Y, value of 2 to 5, and chroma of 2 or less. The Cg horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2.

Shoals Series

The Shoals series consists of somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in loamy alluvium. Slope ranges from 0 to 2 percent.

Shoals soils are similar to Wakeland soils. Wakeland soils formed in silty alluvium and are in landscape positions similar to those of the Shoals soils.

Typical pedon of Shoals silt loam, 2,010 feet north and 510 feet west of the southeast corner of sec. 16, T. 8 N., R. 14 W.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; common very fine roots; few fine dark soft accumulations of iron and manganese oxide; slightly acid; clear smooth boundary.

A—7 to 11 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; few medium distinct light brownish gray (10YR 6/2) and few fine distinct dark yellowish brown (10YR 4/6) mottles; weak fine subangular blocky structure; friable; common very fine roots; few fine dark soft accumulations of iron and manganese oxide; slightly acid; clear smooth boundary.

C—11 to 15 inches; brown (10YR 5/3), stratified silt loam and sandy loam; common medium distinct light brownish gray (10YR 6/2) and dark yellowish brown (10YR 4/6) and few fine distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; common very fine roots; common fine and medium dark soft accumulations of iron and manganese oxide; neutral; clear smooth boundary.

Cg1—15 to 26 inches; light brownish gray (10YR 6/2),

stratified loam and silt loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; common medium and coarse dark soft accumulations and common fine and medium dark concretions of iron and manganese oxide; slightly acid; gradual smooth boundary.

Cg2—26 to 60 inches; light brownish gray (10YR 6/2), stratified loam and silt loam; common fine distinct yellowish brown (10YR 5/4) mottles; massive; friable; common fine and medium dark soft accumulations and common fine and medium dark concretions of iron and manganese oxide; few pebbles; slightly acid.

The Ap and A horizons have value of 4 or 5 and chroma of 2 or 3. The C and Cg horizons have value of 4 to 6.

Tamalco Series

The Tamalco series consists of moderately well drained, very slowly permeable soils on ridges and knolls and on side slopes along drainageways in the uplands. These soils formed in loess. They have a natric horizon. Slope ranges from 1 to 5 percent.

Tamalco soils are similar to Darmstadt soils. The somewhat poorly drained Darmstadt soils are in landscape positions similar to those of the Tamalco soils.

Typical pedon of Tamalco silt loam, 1 to 5 percent slopes, eroded, 400 feet east and 150 feet south of the northwest corner of sec. 3, T. 8 N., R. 9 E.

Ap—0 to 7 inches; mixed brown (10YR 4/3) and dark yellowish brown (10YR 4/4) silt loam, pale brown (10YR 6/3) dry; weak fine and medium subangular blocky structure; friable; few very fine roots; neutral; abrupt smooth boundary.

Bt1—7 to 16 inches; reddish brown (5YR 4/4) silty clay; moderate medium subangular blocky structure; firm; few very fine roots; many distinct brown (7.5YR 4/4) clay films on faces of peds; few prominent dark grayish brown (10YR 4/4) organic coatings on faces of peds; strongly acid; clear smooth boundary.

Bt2—16 to 24 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct yellowish brown (10YR 5/8) mottles; common fine prominent light brownish gray (2.5Y 6/2) mottles in the lower part; moderate coarse subangular blocky structure; firm; few very fine roots; common faint brown (10YR 4/3) clay films on faces of peds; few distinct dark grayish brown (10YR 4/2) organic coatings on faces of peds; common fine dark concretions of iron and manganese oxide; neutral; gradual smooth boundary.

BC—24 to 31 inches; yellowish brown (10YR 5/4) silt loam; common medium prominent light brownish gray (2.5Y 6/2) and common fine faint yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; friable; common fine dark concretions of iron and manganese oxide; moderately alkaline; gradual smooth boundary.

2C—31 to 49 inches; pinkish gray (7.5YR 6/2) and dark brown (7.5YR 4/4) silt loam; few fine distinct yellowish brown (10YR 5/6) mottles; massive; friable; many medium dark concretions of iron and manganese oxide; strongly alkaline; gradual smooth boundary.

3Btb—49 to 60 inches; brown (7.5YR 5/4) silt loam; few fine prominent light brownish gray (2.5Y 6/2) mottles; weak coarse subangular blocky structure; firm; few faint dark brown (7.5YR 4/4) clay films on faces of peds; common fine dark concretions of iron and manganese oxide; common pebbles; strongly alkaline.

The thickness of the solum ranges from 30 to 60 inches. The upper boundary of the natric horizon is 12 to 30 inches below the surface.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. It is silt loam or silty clay loam. Some pedons have an E horizon. The Bt horizon has hue of 10YR, 7.5YR, or 5YR, value of 4 to 6, and chroma of 3 to 8. The 2C horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 4. Some pedons do not have a 3Btb horizon within a depth of 60 inches.

Thebes Series

The Thebes series consists of well drained soils on ridges and side slopes in the uplands and on stream terraces. These soils are moderately permeable in the upper part and rapidly permeable in the lower part. They formed in silty and loamy material over sandy eolian material. Slope ranges from 1 to 10 percent.

The Thebes soils in this survey area have more sand in the control section than is definitive for the series and do not have contrasting textures within a vertical distance of 5 inches. These differences, however, do not significantly affect the use or management of the soils.

Thebes soils are similar to Alvin soils. Alvin soils have more sand and less clay in the upper part than the Thebes soils. They are in landscape positions similar to those of the Thebes soils.

Typical pedon of Thebes silt loam, 1 to 5 percent slopes, 105 feet south and 480 feet west of the

northeast corner of sec. 5, T. 6 N., R. 10 E.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; few very fine roots; about 45 percent sand; slightly acid; abrupt smooth boundary.

E—8 to 12 inches; yellowish brown (10YR 5/4) silt loam; weak fine subangular blocky structure; friable; few very fine roots; few fine dark accumulations of iron and manganese oxide; about 30 percent sand; medium acid; clear smooth boundary.

Bt1—12 to 19 inches; strong brown (7.5YR 5/6) silt loam; moderate fine blocky structure; friable; few very fine roots; few faint dark yellowish brown (10YR 4/4) clay films on faces of peds; few distinct dark brown (10YR 3/3) organic coatings along root channels; about 24 percent sand; medium acid; clear smooth boundary.

Bt2—19 to 29 inches; strong brown (7.5YR 5/6) clay loam; moderate medium subangular blocky structure; firm; few very fine roots; common distinct brown (7.5YR 4/4) clay films on faces of peds; about 26 percent sand; medium acid; clear smooth boundary.

2Bt3—29 to 35 inches; strong brown (7.5YR 5/6) fine sandy loam; moderate medium and coarse subangular blocky structure; friable; few very fine roots; common distinct brown (7.5YR 4/4) clay films on faces of peds; few fine dark accumulations of iron and manganese oxide; about 67 percent sand; slightly acid; abrupt wavy boundary.

2C—35 to 60 inches; strong brown (7.5YR 5/6) fine sand; single grain; loose; wavy discontinuous lamellae of brown (7.5YR 5/4) loamy fine sand ½ inch to 3 inches thick; common faint brown (7.5YR 4/4) clay bridges between sand grains; few fine dark accumulations of iron and manganese oxide at the upper surface of the lamellae; about 89 percent sand; slightly acid.

The thickness of the solum ranges from 30 to 40 inches. The thickness of the silty and loamy material ranges from 20 to 40 inches.

The Ap horizon has value and chroma of 3 or 4. Some pedons do not have an E horizon. The Bt horizon has value of 4 or 5 and chroma of 3 to 6. It is silt loam, clay loam, or silty clay loam. The 2Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is sandy clay loam, loam, fine sandy loam, or sandy loam. In some pedons it is stratified. The 2C horizon is loamy fine sand, fine sand, or sand. Some pedons do not have lamellae.

Wakeland Series

The Wakeland series consists of somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in silty alluvium. Slope ranges from 0 to 2 percent.

Wakeland soils are similar to Haymond and Shoals soils. The well drained Haymond soils are slightly higher on the landscape than the Wakeland soils. Shoals soils contain more sand than the Wakeland soils. They are in landscape positions similar to those of the Wakeland soils.

Typical pedon of Wakeland silt loam, frequently flooded, 2,650 feet west and 1,188 feet south of the northeast corner of sec. 15, T. 7 N., R. 14 E.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; few fine distinct light brownish gray (10YR 6/2) mottles; moderate medium granular structure; very friable; common very fine roots; slightly acid; abrupt smooth boundary.

C1—9 to 22 inches; grayish brown (10YR 5/2) silt loam; common medium distinct yellowish brown (10YR 5/4), many medium faint brown (10YR 5/3), and few fine distinct yellowish brown (10YR 5/6) mottles; weak fine granular structure; very friable; common very fine roots; few distinct dark yellowish brown (10YR 4/4) organic coatings on faces of peds; few fine dark accumulations of iron and manganese oxide; slightly acid; clear smooth boundary.

C2—22 to 44 inches; brown (10YR 5/3) silt loam; many coarse faint grayish brown (10YR 5/2) and few fine distinct yellowish brown (10YR 5/6) mottles; weak fine granular structure; very friable; common very fine roots; few fine dark accumulations of iron and manganese oxide; medium acid; clear smooth boundary.

Cg—44 to 60 inches; grayish brown (10YR 5/2) silt loam; many medium faint brown (10YR 5/3) and common fine distinct yellowish brown (10YR 5/6) mottles; massive; friable; few very fine roots; few fine dark accumulations of iron and manganese oxide; medium acid.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The C horizon has value of 4 to 6 and chroma of 1 to 3.

Wynoose Series

The Wynoose series consists of poorly drained, very slowly permeable soils on broad flats in the uplands. These soils formed in loess and in the underlying

sediments at the surface of Illinoian till. Slope ranges from 0 to 2 percent.

Wynoose soils are similar to Cisne soils. When moist, Cisne soils have value of less than 4 in the Ap horizon. They are in landscape positions similar to those of the Wynoose soils.

Typical pedon of Wynoose silt loam, 3,200 feet west and 2,650 feet north of the southeast corner of sec. 2, T. 8 N., R. 8 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure in the upper part and weak thick platy structure in the lower part; friable; common very fine roots; few fine dark accumulations of iron and manganese oxide; neutral; abrupt smooth boundary.

Eg—7 to 17 inches; light brownish gray (2.5Y 6/2) silt loam; common fine prominent yellowish brown (10YR 5/6) mottles; weak thick platy structure; friable; few very fine roots; few fine and medium dark accumulations of iron and manganese oxide; strongly acid; clear smooth boundary.

Btg1—17 to 28 inches; grayish brown (2.5Y 5/2) silty clay; common fine and medium prominent strong brown (7.5YR 5/6 and 5/8) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; few very fine roots; common faint dark grayish brown (10YR 4/2) clay films on faces of peds; few faint light gray (10YR 7/1 dry) silt coatings on faces of peds; common fine dark accumulations of iron and manganese oxide; strongly acid; clear smooth boundary.

Btg2—28 to 36 inches; light brownish gray (2.5Y 6/2) silty clay; common fine prominent strong brown (7.5YR 5/6 and 5/8) mottles; weak coarse prismatic structure; firm; few very fine roots; few faint grayish brown (2.5Y 5/2) clay films on faces of peds; few faint light gray (10YR 7/1 dry) silt coatings on faces of peds; common fine dark accumulations of iron and manganese oxide; strongly acid; clear smooth boundary.

2Btg3—36 to 46 inches; light brownish gray (10YR 6/2) silty clay loam; common medium prominent strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure; firm; few faint grayish brown (10YR 5/2) clay films on faces of peds; common medium dark accumulations of iron and manganese oxide; few till pebbles; strongly acid; clear smooth boundary.

2Cg—46 to 60 inches; gray (10YR 5/1) silt loam; common medium prominent strong brown (7.5YR 5/6) and few fine distinct dark yellowish brown (10YR 4/6) mottles; massive; firm; few medium accumulations of iron and manganese oxide; few till pebbles; strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the loess ranges from 30 to 45 inches.

The Ap horizon has value of 4 or 5 and chroma of 1 or 2. The Eg horizon has value of 5 to 7 and chroma of 1 or 2. The Btg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. It is silty clay loam or silty clay. The 2Btg and 2Cg horizons are silty clay loam, silt loam, loam, or clay loam.

Formation of the Soils

Soil forms as a result of the interactions among soil-forming processes *(6)*. The characteristics of a soil at any given place are determined by the physical and mineralogical composition of the parent material; the climate under which the soil material has accumulated and existed since accumulation; the native vegetative and animal life on and in the soil; relief; and the amount of time that the soil-forming factors have acted on the soil material.

Climate, vegetation, and animal life are active factors of soil formation. They act on the parent material, slowly changing it into a natural body that has genetically related horizons. The effects of climate, vegetation, and animal life are conditioned by relief. The parent material affects the kind of soil that forms and in a few areas determines it almost entirely. Time is needed for the transformation of the parent material into a soil. The five factors of soil formation are so closely interrelated that the effect of one factor can be explained only if the conditions for the other factors are specified.

Parent Material

Parent material is the unconsolidated geologic material in which a soil forms. It affects the mineralogical and chemical nature of the soil and, to a large extent, determines the rate of soil formation. The soils in Jasper County formed in loess, alluvium, glacial material, windblown sandy material, and shale.

On about 53 percent of the acreage in the county, the soils formed either partly or entirely in loess, which is silty windblown material. The primary source of the loess was the flood plain along the Mississippi River. The flood plain along the Embarras River was a minor source. The loess is about 3 to 5 feet thick in the nearly level areas throughout the county. It generally is thicker in depressions and low areas. Cisne, Newberry, and Wynoose soils formed in about 3 or 4 feet of loess and in the underlying material. Shiloh soils, which are in depressions in the uplands, formed in more than 5 feet of loess.

On about 27 percent of the acreage in the county, the soils formed in alluvial sediments on flood plains. These sediments were deposited by water. The texture of the soils is determined by the velocity of the water. Most of the soils on the flood plains in the county formed in silty alluvium. Examples are Haymond, Petrolia, and Wakeland soils. Darwin soils formed in clayey sediments in sloughs, swales, and slack-water areas along the major streams. Some of these fine textured sediments are in areas of the former glacial Lake Embarras in the southeastern part of the county. This large slack-water lake formed when the Wabash River Valley filled with outwash from the Wisconsin glacier and could not contain the flow of meltwater. The water backed up into the Embarras River Valley and deposited the clayey sediments. The soils in some areas adjacent to the major streams formed in moderately coarse textured or coarse textured alluvium. Landes soils, which formed in fine sandy loam and loamy fine sand, are an example.

Glacial till is material deposited directly by glaciers with a minimum of water action. It consists of mixed particles of different sizes. In Jasper County the till is loamy. It underlies the soils in the uplands and is at the surface on side slopes along the sloping to very steep drainageways. This material was transported and deposited by the Illinoian ice sheet and is part of the Vandalia Till Member of the Glasford Formation *(18)*. Examples of soils that formed in glacial till are Atlas and Hickory soils.

Sodium affects about 10 percent of the soils in the survey area. Darmstadt, Huey, and Tamalco soils have a high content of sodium in the subsoil. The main source of the sodium is feldspars in the loess. The sodium weathered from the sodium-rich feldspars and was concentrated by the lateral movement of ground water above the Illinoian till. The lateral movement was caused by a variation in the permeability in the till *(16)*.

Windblown sandy material is on the eastern bluffs and uplands adjacent to the flood plains along the major streams in the county. It was deposited shortly after the glacial floodwater receded. Alvin and Chelsea soils formed entirely in this material. Thebes soils formed in a thin mantle of loess over the sandy material *(18)*.

Gosport soils formed in material weathered from shale (fig. 13). This shale is of Pennsylvanian age and

Figure 13.—An outcrop of shale in an area of Hickory-Gosport complex, 18 to 30 percent slopes. Gosport soils formed mainly in shale residuum.

underlies the unconsolidated deposits in the county. It is exposed on the lower part of some of the steep and very steep slopes in the county.

Climate

Jasper County has a temperate, humid, continental climate. Because it is essentially uniform throughout the county, the climate has not caused any obvious differences among the soils within the county. It has differentiated those soils, however, from the soils in other broad regions.

Climate is a very important factor of soil formation because it affects weathering, vegetation, and erosion. Temperature and precipitation affect the physical and chemical nature of the soil. The weathering of minerals in the soil accelerates as the temperature increases. As water moves through the soil, soluble salts are dissolved and transported downward. The water also transports clay-sized particles from the surface soil into the subsoil. The Alfisols in Jasper County are characterized by this translocation of clay. The temperature and precipitation in the county favor both prairie and forest vegetation. Precipitation can also affect soil formation through its effect on erosion. As the rate of erosion approaches the rate of soil formation, the soil generally exhibits less profile development.

Additional information about the climate is given under the heading "General Nature of the County."

Vegetation and Animal Life

Plants are the principal living organisms affecting the soils in Jasper County. Micro-organisms, earthworms, insects, and large burrowing animals that live in or on the soil and human activities also have affected soil formation.

The chief contribution of plant and animal life to soil formation is the addition of organic material and nitrogen to the soil. The kind of organic material on and in the soil depends on the kind of native plants that grew on the soil. The remains of these plants accumulated in the surface layer, decayed, and eventually became organic matter in the soil. The roots of the plants provided channels for the downward movement of water through the soil and also added organic matter as they decayed. Burrowing animals, such as earthworms, crawfish, cicadas, and groundhogs, helped to break down the organic matter into plant nutrients.

The native vegetation in Jasper County was mainly deciduous hardwoods and prairie grasses. Various species of oak, hickory, maple, elm, walnut, and ash were dominant in the wooded areas. Hickory, Wynoose, and other soils that formed under forest vegetation have a thin, relatively light colored surface layer. Decomposed leaf litter is the main source of the organic matter in these soils. Ebbert, Shiloh, and other soils that formed under prairie grasses have a thick, dark surface soil. The many fine, fibrous grass roots in the upper part of these soils add large amounts of organic matter when they die and decompose. Cisne, Hoyleton, and other soils that formed under prairie grasses and widely spaced trees have a surface layer that is not so thick as that of the soils that formed only under prairie grasses.

Human activities can affect soil formation. Farming can reduce the content of organic matter in the surface soil and increase the rate of runoff and the susceptibility to erosion. Building levees can reduce the frequency of flooding and prevent the deposition of soil material. Borrowing soil material for construction sites and cutting and filling in areas used for roadways, dams, and levees have altered some soils, such as the clayey Orthents. Storing oil waste products in pits and drilling for oil may release salts or chemicals, which are toxic to plants and animals.

Relief

Variations in the slope of the land surface greatly affect the runoff rate, the infiltration rate, the extent of erosion, and the natural drainage of the soil.

A comparison between soils that formed in similar kinds of parent material but under different drainage conditions indicates the effect of slope on soil formation. Cisne and Richview soils formed in loess and in the underlying sediments at the surface of Illinoian till. The Cisne soils are nearly level and poorly drained and have a grayish subsoil. The Richview soils are gently sloping and moderately sloping, are moderately well drained, and have a brownish subsoil. The color of the subsoil is affected by the degree of oxidation of certain mineral compounds, chiefly iron. Nearly level or depressional soils, such as the Cisne soils, have a water table close to the surface, especially during spring. The water in the soil pores restricts the circulation of air. Under these conditions, the iron is poorly oxidized and is gray. The water table is lower in the more sloping Richview soils, and some of the rainfall runs off the surface. As a result, these soils are drier and more air is in the pores. Under these conditions, the iron in the subsoil is better oxidized and is brown. Soils that formed in some of the intermediate landscape positions, such as low knolls or ridges, are somewhat poorly drained and have a grayish and brownish, mottled subsoil. Bluford and Hoyleton soils are examples.

Time

Time affects the degree of profile development in a soil. The influence of time, however, can be modified by the deposition of material, the topography, and the kind of parent material.

Soils on flood plains receive alluvial material during each flood. This repeated deposition slows soil formation. As a result, the soils on flood plains are much younger than the other soils in the county and have a weakly expressed profile. Wakeland soils are an example.

Nearly level soils commonly are genetically and morphologically older than the more sloping soils. The slope affects the amount of water that penetrates the surface and percolates through the soil. The degree of profile development tends to decrease as slope increases.

Variations in parent material can account for some differences between soils that have been exposed to weathering for the same amount of time. For example, Gosport soils, which formed in material weathered from shale, have horizons that are less distinct than those in Hickory soils, which formed in glacial till. This difference is caused by a slower rate of weathering in the shale.

References

(1) American Association of State Highway and Transportation Officials. 1982. Standard specifications for highway materials and methods of sampling and testing. Ed. 13, 2 vols., illus.

(2) American Society for Testing and Materials. 1988. Standard test method for classification of soils for engineering purposes. ASTM Stand. D 2487.

(3) Fehrenbacher, J.B., R.A. Pope, I.J. Jansen, J.D Alexander, and B.W. Ray. 1978. Soil productivity in Illinois. Univ. of Ill., Coll. of Agric., Coop. Ext. Serv. Circ. 1156, 21 pp., illus.

(4) Fisher, R.E. 1984. 1961 Illinois water inventory. Ill. Dep. Conserv., Div. of Fisheries, Ed. 20, 1 p.

(5) Illinois Department of Public Health, State of Illinois. 1982. Private sewage disposal licensing act and code. 1977 Ill. Bar Ed., Ill. Rev. Statutes, 63 pp., illus.

(6) Jenny, Hans. 1941. Factors of soil formation. 281 pp., illus.

(7) Leighton, M.M., G.E. Ekblaw, and Leland Horberg. 1948. Physiographic divisions of Illinois. Ill. Geol. Sur. Rep. of Invest. 129, 33 pp., illus.

(8) Lockhart, Jim. 1973. The last chance. Ill. Dep. Conserv., Div. Wildl. Resour., 8 pp., illus.

(9) Smith, R.S., and L.H. Smith. 1940. Jasper County soils. Univ. Ill., Agric. Exp. Stn. Soil Rep. 68, 27 pp., illus.

(10) Sunderland, Sarah Taylor. 1976. New and complete history of Jasper County, Illinois, and the 1884 history of Jasper County. 584 pp.

(11) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus.

(12) United States Department of Agriculture. 1961. Land capability classification. U.S. Dep. Agric. Handb. 210, 21 pp.

(13) United States Department of Agriculture. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil Conserv. Serv., U.S. Dep. Agric. Handb. 436, 754 pp., illus.

(14) United States Department of Agriculture, Soil Conservation Service. Conservation needs inventory. (Unpublished report prepared in 1977)

(15) United States Department of Commerce, Bureau of the Census. 1984. Illinois state and county data. Vol. 1, part 13.

(16) Wilding, L.P., and others. 1963. Source and distribution of sodium in solonetzic soils in Illinois. Soil Sci. Soc. Proc., 6 pp., illus.

(17) Williams, F.E., and M.W. Rolley. 1955. Subsurface geology and coal resources of the Pennsylvanian System in Jasper County, Illinois. Ill. Geol. Surv. Rep. of Invest. 181, 14 pp., illus.

(18) Willman, H.B., and John C. Frye. 1970. Pleistocene stratigraphy of Illinois. Ill. Geol. Surv. Bull. 94, 204 pp., illus.

Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aerobic treatment plant. A plant in which equipment or devices use forced air or oxygen to treat sewage.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, for example, fire, that exposes the surface.

Escarpment. A steep face terminating high lands abruptly; a very steep slope or descent.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots.

When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when

thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:
Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.
Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.
Sprinkler.—Water is sprayed over the surface through pipes or nozzles from a pressure system.
Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon. A special kind of argillic horizon that

contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Paleosol. A soil that formed on a landscape during the geologic past and subsequently buried by sedimentation. Erosion may have removed the overlying mantle of sediments during recent times, exposing the paleosol.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range in moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated

erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity. Synonym: scald.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^{+} to Ca^{++} + Mg^{++}. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediments of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-80 at Effingham, Illinois)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	36.2	18.3	27.3	65	-11	4	2.13	1.06	3.05	5	6.1
February----	41.3	22.2	31.7	68	-6	5	2.19	1.10	3.14	4	4.2
March-------	51.7	31.5	41.6	77	9	49	3.62	1.88	5.14	7	3.9
April-------	66.0	42.9	54.5	85	24	206	3.77	2.07	5.28	7	.2
May---------	76.0	51.9	64.0	92	32	445	3.79	2.18	5.22	7	.0
June--------	85.0	61.9	73.0	97	45	701	4.53	2.01	6.69	6	.0
July--------	88.5	65.1	76.8	99	50	838	4.23	2.58	5.71	6	.0
August------	86.8	62.9	74.9	98	48	779	2.60	1.30	3.74	5	.0
September---	80.6	55.1	67.9	96	36	546	3.20	1.31	4.79	5	.0
October-----	68.8	43.5	56.2	90	25	246	2.39	1.15	3.47	4	.0
November----	53.1	33.2	43.2	78	10	56	3.07	1.44	4.47	5	1.7
December----	41.1	24.5	32.8	67	-3	7	2.93	1.08	4.47	5	3.8
Yearly:											
Average---	64.6	42.7	53.7	---	---	---	---	---	---	---	---
Extreme---	---	---	---	111	-24	---	---	---	---	---	---
Total-----	---	---	---	---	---	3,882	38.45	---	---	66	19.9

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-80 at Effingham, Illinois)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Mar. 1	Mar. 12	Apr. 4
2 years in 10 later than--	Mar. 10	Mar. 24	Apr. 9
5 years in 10 later than--	Mar. 23	Apr. 3	Apr. 16
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 22	Oct. 5	Oct. 3
2 years in 10 earlier than--	Nov. 2	Oct. 18	Oct. 5
5 years in 10 earlier than--	Nov. 7	Oct. 29	Oct. 17

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-80 at Effingham, Illinois)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	202	181	157
8 years in 10	210	189	164
5 years in 10	226	204	177
2 years in 10	242	219	191
1 year in 10	251	227	198

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
2	Cisne silt loam	74,105	23.4
3B	Hoyleton silt loam, 1 to 3 percent slopes	17,165	5.4
3B2	Hoyleton silt loam, 2 to 5 percent slopes, eroded	3,275	1.0
4B	Richview silt loam, 2 to 5 percent slopes	390	0.1
4C2	Richview silt loam, 5 to 10 percent slopes, eroded	310	0.1
7C2	Atlas silt loam, 5 to 10 percent slopes, eroded	9,265	2.9
7C3	Atlas silty clay loam, 5 to 10 percent slopes, severely eroded	2,045	0.6
7D2	Atlas silt loam, 10 to 15 percent slopes, eroded	4,670	1.5
7D3	Atlas silty clay loam, 10 to 15 percent slopes, severely eroded	1,700	0.5
8F	Hickory loam, 15 to 30 percent slopes	4,775	1.5
8F2	Hickory loam, 15 to 30 percent slopes, eroded	7,365	2.3
8G	Hickory loam, 30 to 60 percent slopes	2,980	0.9
12	Wynoose silt loam	22,010	6.9
13A	Bluford silt loam, 0 to 2 percent slopes	35,855	11.3
13B2	Bluford silt loam, 2 to 5 percent slopes, eroded	4,575	1.4
14B	Ava silt loam, 1 to 5 percent slopes	15,465	4.8
14C2	Ava silt loam, 5 to 10 percent slopes, eroded	1,920	0.6
48	Ebbert silt loam	2,965	0.9
109	Racoon silt loam	3,420	1.1
120	Huey silt loam	4,620	1.4
131B	Alvin fine sandy loam, 1 to 5 percent slopes	995	0.3
131C2	Alvin fine sandy loam, 5 to 12 percent slopes, eroded	1,010	0.3
131E2	Alvin fine sandy loam, 12 to 25 percent slopes, eroded	440	0.1
138	Shiloh silty clay loam	1,100	0.3
178	Ruark fine sandy loam	800	0.3
184	Roby fine sandy loam	480	0.2
212B	Thebes silt loam, 1 to 5 percent slopes	2,760	0.9
212C2	Thebes silt loam, 5 to 10 percent slopes, eroded	360	0.1
218	Newberry silt loam	12,930	4.1
424	Shoals silt loam	1,215	0.4
533	Urban land	320	0.1
581B2	Tamalco silt loam, 1 to 5 percent slopes, eroded	1,360	0.4
620A	Darmstadt silt loam, 0 to 2 percent slopes	14,865	4.7
620B2	Darmstadt silt loam, 2 to 5 percent slopes, eroded	5,480	1.7
779D	Chelsea loamy fine sand, 7 to 18 percent slopes	175	0.1
805C	Orthents, clayey, sloping	390	0.1
866	Dumps, slurry	390	0.1
967F	Hickory-Gosport complex, 18 to 30 percent slopes	3,625	1.1
967G	Hickory-Gosport complex, 30 to 60 percent slopes	1,970	0.6
991	Cisne-Huey silt loams	2,155	0.7
3071	Darwin silty clay, frequently flooded	1,070	0.3
3288	Petrolia silty clay loam, frequently flooded	9,510	3.0
3304	Landes fine sandy loam, frequently flooded	2,210	0.7
3331	Haymond silt loam, frequently flooded	8,745	2.7
3333	Wakeland silt loam, frequently flooded	15,380	4.8
7071	Darwin silty clay, rarely flooded	1,465	0.5
7288	Petrolia silty clay loam, rarely flooded	3,185	1.0
7304	Landes fine sandy loam, rarely flooded	660	0.2
7331	Haymond silt loam, rarely flooded	890	0.3
7333	Wakeland silt loam, rarely flooded	1,640	0.5
	Water	2,650	0.8
	Total	319,100	100.0

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
2	Cisne silt loam (where drained)
3B	Hoyleton silt loam, 1 to 3 percent slopes
3B2	Hoyleton silt loam, 2 to 5 percent slopes, eroded
4B	Richview silt loam, 2 to 5 percent slopes
13A	Bluford silt loam, 0 to 2 percent slopes (where drained)
13B2	Bluford silt loam, 2 to 5 percent slopes, eroded (where drained)
14B	Ava silt loam, 1 to 5 percent slopes
48	Ebbert silt loam (where drained)
109	Racoon silt loam (where drained)
131B	Alvin fine sandy loam, 1 to 5 percent slopes
138	Shiloh silty clay loam (where drained)
178	Ruark fine sandy loam (where drained)
184	Roby fine sandy loam
212B	Thebes silt loam, 1 to 5 percent slopes
218	Newberry silt loam (where drained)
424	Shoals silt loam (where drained and either protected from flooding or not frequently flooded during the growing season)
3288	Petrolia silty clay loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
3304	Landes fine sandy loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
3331	Haymond silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
3333	Wakeland silt loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
7071	Darwin silty clay, rarely flooded (where drained)
7288	Petrolia silty clay loam, rarely flooded (where drained)
7304	Landes fine sandy loam, rarely flooded
7331	Haymond silt loam, rarely flooded
7333	Wakeland silt loam, rarely flooded (where drained)

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Tall fescue-alfalfa hay	Tall fescue
		Bu	Bu	Bu	Tons	AUM*
2------------------------- Cisne	IIIw	115	35	52	---	---
3B------------------------ Hoyleton	IIe	115	34	52	4.7	7.8
3B2----------------------- Hoyleton	IIe	111	33	51	4.5	7.5
4B------------------------ Richview	IIe	109	33	50	4.6	7.6
4C2----------------------- Richview	IIIe	103	31	47	4.3	7.1
7C2----------------------- Atlas	IIIe	52	16	19	2.2	3.6
7C3----------------------- Atlas	IVe	43	14	16	1.8	3.0
7D2----------------------- Atlas	IVe	49	15	18	2.1	3.4
7D3----------------------- Atlas	VIe	---	---	---	1.7	2.8
8F------------------------ Hickory	VIe	---	---	---	2.4	4.0
8F2----------------------- Hickory	VIe	---	---	---	2.1	3.6
8G------------------------ Hickory	VIIe	---	---	---	---	---
12------------------------ Wynoose	IIIw	96	33	46	---	---
13A----------------------- Bluford	IIw	103	33	49	4.1	6.8
13B2---------------------- Bluford	IIe	99	32	47	3.9	6.5
14B----------------------- Ava	IIe	97	33	48	4.3	7.1
14C2---------------------- Ava	IIIe	89	30	44	3.9	6.5
48------------------------ Ebbert	IIw	130	42	54	---	---
109----------------------- Racoon	IIIw	108	35	48	---	---

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Tall fescue-alfalfa hay	Tall fescue
		Bu	Bu	Bu	Tons	AUM*
120----------------------- Huey	IVw	64	23	33	---	---
131B---------------------- Alvin	IIe	97	36	48	4.3	6.7
131C2--------------------- Alvin	IIIe	93	35	44	3.9	6.4
131E2--------------------- Alvin	IVe	83	31	40	3.4	5.7
138----------------------- Shiloh	IIw	139	46	56	---	---
178----------------------- Ruark	IIIw	100	35	44	3.5	5.8
184----------------------- Roby	IIs	98	36	45	4.0	6.7
212B---------------------- Thebes	IIe	99	35	46	4.0	6.6
212C2--------------------- Thebes	IIIe	94	33	43	3.8	6.3
218----------------------- Newberry	IIw	118	37	53	---	---
424----------------------- Shoals	IVw	89	32	39	3.5	5.8
533**. Urban land						
581B2--------------------- Tamalco	IIIe	65	23	32	2.7	4.6
620A---------------------- Darmstadt	IIIw	69	26	36	3.0	5.0
620B2--------------------- Darmstadt	IIIe	65	24	34	2.8	4.7
779D---------------------- Chelsea	VIs	---	---	---	2.2	3.9
805C**. Orthents						
866**. Dumps						
967F---------------------- Hickory-Gosport	VIIe	---	---	---	1.9	3.4
967G---------------------- Hickory-Gosport	VIIe	---	---	---	---	---

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Tall fescue-alfalfa hay	Tall fescue
		Bu	Bu	Bu	Tons	AUM*
991: Cisne-Huey	IVw	92	29	44	---	---
3071: Darwin	IVw	69	25	---	---	---
3288: Petrolia	IIIw	110	35	---	4.0	6.0
3304: Landes	IIIw	50	17	---	1.9	3.1
3331: Haymond	IIw	123	40	---	4.7	7.7
3333: Wakeland	IIw	115	38	---	4.4	7.4
7071: Darwin	IIIw	94	33	45	---	---
7288: Petrolia	IIw	125	41	47	4.3	7.1
7304: Landes	IIs	94	32	43	3.5	5.9
7331: Haymond	I	133	43	57	5.0	8.4
7333: Wakeland	IIw	128	43	54	4.9	8.3

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
7C2, 7C3, 7D2, 7D3: Atlas	4C	Slight	Slight	Moderate	Moderate	White oak	70	52	Green ash, pin oak, red maple, Austrian pine.
						Northern red oak	70	52	
						Bur oak	70	52	
						Green ash	---	---	
8F, 8F2: Hickory	5R	Moderate	Moderate	Slight	Slight	White oak	85	67	Eastern white pine, red pine, yellow poplar, sugar maple, white oak, black walnut.
						Northern red oak	85	67	
						Black oak	---	---	
						Green ash	---	---	
						Bitternut hickory	---	---	
						Yellow poplar	95	98	
8G: Hickory	5R	Severe	Severe	Slight	Slight	White oak	85	67	Eastern white pine, red pine, yellow poplar, sugar maple, white oak, black walnut.
						Northern red oak	85	67	
						Black oak	---	---	
						Green ash	---	---	
						Bitternut hickory	---	---	
						Yellow poplar	95	98	
12: Wynoose	4W	Slight	Severe	Moderate	Moderate	Pin oak	70	52	Pin oak, red maple.
						White oak	---	---	
						Black oak	---	---	
13A, 13B2: Bluford	4A	Slight	Slight	Slight	Slight	White oak	70	52	Shortleaf pine, loblolly pine, eastern white pine, eastern redcedar.
						Northern red oak	70	52	
						Southern red oak	70	52	
						Green ash	---	---	
						Bur oak	---	---	
14B, 14C2: Ava	4A	Slight	Slight	Slight	Slight	White oak	75	57	Black walnut, eastern cottonwood, sweetgum, yellow poplar, white oak, American sycamore.
						Northern red oak	80	62	
						Yellow poplar	90	90	
						Black walnut	---	---	
109: Racoon	4W	Slight	Severe	Moderate	Severe	Pin oak	80	62	Baldcypress, pin oak, water tupelo, red maple.
						Post oak	80	62	
						Green ash	---	---	
						White oak	---	---	
131B, 131C2: Alvin	4A	Slight	Slight	Slight	Slight	White oak	80	62	Green ash, black walnut, yellow poplar, white oak, eastern white pine, American sycamore, sugar maple.
						Northern red oak	80	62	
						Black walnut	---	---	
						Yellow poplar	90	90	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Volume*	Trees to plant
131E2----------- Alvin	4R	Moderate	Moderate	Slight	Slight	White oak----------- Northern red oak---- Black walnut-------- Yellow poplar-------	80 80 --- 90	62 62 --- 90	Green ash, black walnut, yellow poplar, white oak, eastern white pine, American sycamore, sugar maple.
178------------- Ruark	4W	Slight	Moderate	Moderate	Slight	Pin oak------------- White oak----------- Green ash----------- Yellow poplar-------	80 --- --- 80	62 --- --- 71	Baldcypress, pin oak, green ash, water tupelo, red maple.
184------------- Roby	4A	Slight	Slight	Slight	Slight	White oak----------- Northern red oak---- Yellow poplar------- Black walnut--------	80 80 90 ---	62 62 90 ---	Black walnut, eastern cottonwood, American sycamore, yellow poplar, white oak, eastern white pine.
212B, 212C2----- Thebes	4A	Slight	Slight	Slight	Slight	White oak----------- Northern red oak---- Black walnut-------- Yellow poplar-------	80 80 --- 90	62 62 --- 90	White oak, black walnut, green ash, sugar maple, eastern white pine, red pine.
424------------- Shoals	5W	Slight	Moderate	Moderate	Slight	Pin oak------------- Sweetgum------------ Yellow poplar------- Virginia pine------- Eastern cottonwood-- White ash-----------	90 86 90 90 --- ---	72 95 90 135 --- ---	Sweetgum, red maple, swamp chestnut oak, pin oak, yellow poplar.
779D------------ Chelsea	3S	Slight	Slight	Moderate	Slight	White oak-----------	55	38	Eastern white pine, Scotch pine, European larch, eastern redcedar, red pine, jack pine.
967F**: Hickory--------	5R	Moderate	Moderate	Slight	Slight	White oak----------- Northern red oak---- Black oak----------- Green ash----------- Bitternut hickory--- Yellow poplar-------	85 85 --- --- --- 95	67 67 --- --- --- 98	Eastern white pine, red pine, yellow poplar, sugar maple, white oak, black walnut.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
967F**:									
Gosport	2R	Moderate	Moderate	Severe	Severe	White oak	45	30	Eastern white pine, red pine, Norway spruce, Scotch pine, white spruce, cottonwood.
967G**:									
Hickory	5R	Severe	Severe	Slight	Slight	White oak	85	67	Eastern white pine, red pine, yellow poplar, sugar maple, white oak, black walnut.
						Northern red oak	85	67	
						Black oak	---	---	
						Green ash	---	---	
						Bitternut hickory	---	---	
						Yellow poplar	95	98	
Gosport	2R	Severe	Severe	Severe	Severe	White oak	45	30	Eastern white pine, red pine, Norway spruce, Scotch pine, white spruce, cottonwood.
3071 Darwin	4W	Slight	Severe	Severe	Moderate	Pin oak	80	62	Eastern cottonwood, American sycamore, red maple, green ash, pin oak.
						Swamp white oak	---	---	
						Eastern cottonwood	---	---	
						Green ash	---	---	
						American sycamore	---	---	
3288 Petrolia	5W	Slight	Moderate	Moderate	Slight	Pin oak	90	72	Eastern cottonwood, red maple, American sycamore, baldcypress, water tupelo.
						Eastern cottonwood	100	128	
						Sweetgum	---	---	
						Cherrybark oak	---	---	
						American sycamore	---	---	
3304 Landes	7A	Slight	Slight	Slight	Slight	Yellow poplar	95	98	Eastern cottonwood, yellow poplar, American sycamore, sweetgum, green ash, black walnut, eastern white pine, sugar maple.
						Eastern cottonwood	105	141	
						American sycamore	---	---	
						Sweetgum	---	---	
						Green ash	---	---	
3331 Haymond	8A	Slight	Slight	Slight	Slight	Yellow poplar	100	107	Eastern white pine, black walnut, yellow poplar, black locust.
						White oak	90	72	
						Black walnut	70	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
3333------------ Wakeland	5A	Slight	Slight	Slight	Slight	Pin oak------------- Sweetgum------------ Yellow poplar------- Virginia pine-------	90 88 90 85	72 101 90 129	Eastern white pine, baldcypress, American sycamore, red maple, white ash.

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- 8-15	16-25	26-35	>35
2----------------- Cisne	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine----	Pin oak.
3B, 3B2----------- Hoyleton	Amur privet, arrowwood, Amur honeysuckle, American cranberrybush, common chokecherry.	Austrian pine, green ash, Osageorange, eastern redcedar, Washington hawthorn.	Eastern white pine, pin oak.	---
4B, 4C2----------- Richview	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
7C2, 7C3, 7D2, 7D3-------------- Atlas	American cranberrybush, Amur honeysuckle, arrowwood, Amur privet.	Osageorange, green ash, Austrian pine, Washington hawthorn, eastern redcedar.	Pin oak, eastern white pine.	---
8F, 8F2----------- Hickory	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
8G. Hickory				
12---------------- Wynoose	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine----	Pin oak.
13A, 13B2--------- Bluford	Amur privet, arrowwood, Amur honeysuckle, American cranberrybush, common chokecherry.	Austrian pine, green ash, Osageorange, eastern redcedar, Washington hawthorn.	Eastern white pine, pin oak.	---
14B, 14C2--------- Ava	Amur privet, arrowwood, Amur honeysuckle, American cranberrybush, common chokecherry.	Austrian pine, green ash, Osageorange, Washington hawthorn, eastern redcedar.	Eastern white pine, pin oak.	---
48---------------- Ebbert	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine----	Pin oak.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
109----------------Racoon	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine----	Pin oak.
120----------------Huey	Eastern redcedar, Russian olive, silky dogwood.	Siberian elm, green ash, Osageorange.	---	---
131B, 131C2, 131E2------------Alvin	Amur privet, Washington hawthorn, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, northern whitecedar, Osageorange, eastern redcedar.	Eastern white pine, red pine, Norway spruce.	---
138----------------Shiloh	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine----	Pin oak.
178----------------Ruark	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine----	Pin oak.
184----------------Roby	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Austrian pine, white fir, blue spruce, Washington hawthorn, northern whitecedar.	Norway spruce---------	Eastern white pine, pin oak.
212B, 212C2-------Thebes	Amur honeysuckle, lilac, eastern redcedar, radiant crabapple, Washington hawthorn, autumn olive, common chokecherry.	Eastern white pine, Austrian pine, red pine, jack pine, green ash.	---	---
218----------------Newberry	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine----	Pin oak.
424----------------Shoals	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Northern whitecedar, Austrian pine, white fir, blue spruce, Washington hawthorn.	Norway spruce---------	Eastern white pine, pin oak.
533*. Urban land				

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- 8-15	16-25	26-35	>35
581B2 Tamalco	Russian olive, eastern redcedar.	Siberian elm, green ash, Osageorange.	---	---
620A, 620B2 Darmstadt	Eastern redcedar, Russian olive.	Siberian elm, green ash, Osageorange.	---	---
779D Chelsea	Eastern redcedar, radiant crabapple, Washington hawthorn, autumn olive, Amur honeysuckle, lilac.	Austrian pine, red pine, blue spruce, northern whitecedar, green ash.	Eastern white pine	---
805C*. Orthents				
866*. Dumps				
967F*:				
Hickory	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Gosport	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, American cranberrybush.	Austrian pine, green ash, Osageorange.	Eastern white pine, pin oak.	---
967G*:				
Hickory.				
Gosport.				
991*:				
Cisne	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
Huey	Eastern redcedar, Russian olive, silky dogwood.	Siberian elm, green ash, Osageorange.	---	---
3071 Darwin	Amur privet, silky dogwood, Amur honeysuckle, American cranberrybush.	Austrian pine, northern whitecedar, blue spruce, Washington hawthorn, white fir.	Eastern white pine, Norway spruce.	Pin oak.
3288 Petrolia	Silky dogwood, Amur privet, American cranberrybush, Amur honeysuckle.	White fir, blue spruce, Washington hawthorn, Norway spruce, Austrian pine, northern whitecedar.	Eastern white pine	Pin oak.

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- 8-15	16-25	26-35	>35
3304. Landes	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
3331. Haymond	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
3333. Wakeland	Amur honeysuckle, Amur privet, American cranberrybush, silky dogwood.	Northern whitecedar, Austrian pine, white fir, blue spruce, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
7071. Darwin	Amur privet, silky dogwood, Amur honeysuckle, American cranberrybush.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, Washington hawthorn, white fir.	Eastern white pine	Pin oak.
7288. Petrolia	Silky dogwood, Amur privet, American cranberrybush, Amur honeysuckle.	White fir, blue spruce, Washington hawthorn, Norway spruce, Austrian pine, northern whitecedar.	Eastern white pine	Pin oak.
7304. Landes	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
7331. Haymond	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
7333. Wakeland	Amur honeysuckle, Amur privet, American cranberrybush, silky dogwood.	Northern whitecedar, Austrian pine, white fir, blue spruce, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
2 Cisne	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
3B, 3B2 Hoyleton	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
4B Richview	Slight	Slight	Moderate: slope.	Slight	Slight.
4C2 Richview	Slight	Slight	Severe: slope.	Slight	Slight.
7C2, 7C3 Atlas	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
7D2, 7D3 Atlas	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness, slope.
8F, 8F2 Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
8G Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
12 Wynoose	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
13A, 13B2 Bluford	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
14B Ava	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight	Moderate: wetness.
14C2 Ava	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Slight	Moderate: wetness.
48 Ebbert	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
109 Racoon	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
120 Huey	Severe: ponding, percs slowly, excess sodium.	Severe: ponding, excess sodium, percs slowly.	Severe: ponding, percs slowly, excess sodium.	Severe: ponding.	Severe: excess sodium, ponding.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
131B Alvin	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
131C2 Alvin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.
131E2 Alvin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
138 Shiloh	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
178 Ruark	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
184 Roby	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
212B Thebes	Slight	Slight	Moderate: slope.	Severe: erodes easily.	Slight.
212C2 Thebes	Slight	Slight	Severe: slope.	Severe: erodes easily.	Slight.
218 Newberry	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
424 Shoals	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
533*. Urban land					
581B2 Tamalco	Severe: percs slowly, excess sodium.	Severe: excess sodium, percs slowly.	Severe: percs slowly, excess sodium.	Slight	Severe: excess sodium.
620A, 620B2 Darmstadt	Severe: wetness, percs slowly, excess sodium.	Severe: excess sodium, percs slowly.	Severe: wetness, percs slowly.	Severe: erodes easily.	Severe: excess sodium.
779D Chelsea	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.	Moderate: droughty, slope.
805C*. Orthents					
866*. Dumps					
967F*: Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
967F*:					
Gosport	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Severe: slope.
967G*:					
Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Gosport	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, erodes easily.	Severe: slope.
991*:					
Cisne	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
Huey	Severe: ponding, percs slowly, excess sodium.	Severe: ponding, excess sodium, percs slowly.	Severe: ponding, percs slowly, excess sodium.	Severe: ponding.	Severe: excess sodium, ponding.
3071 Darwin	Severe: flooding, ponding, percs slowly.	Severe: ponding, too clayey, percs slowly.	Severe: too clayey, ponding, flooding.	Severe: ponding, too clayey.	Severe: ponding, flooding, too clayey.
3288 Petrolia	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
3304 Landes	Severe: flooding.	Moderate: flooding.	Slight	Moderate: flooding.	Severe: flooding.
3331 Haymond	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
3333 Wakeland	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
7071 Darwin	Severe: flooding, ponding, percs slowly.	Severe: ponding, too clayey, percs slowly.	Severe: too clayey, ponding, percs slowly.	Severe: ponding, too clayey.	Severe: ponding, too clayey.
7288 Petrolia	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
7304 Landes	Severe: flooding.	Slight	Slight	Slight	Moderate: small stones.
7331 Haymond	Severe: flooding.	Slight	Slight	Slight	Slight.
7333 Wakeland	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
2------------------ Cisne	Fair	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
3B, 3B2------------ Hoyleton	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
4B----------------- Richview	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
4C2---------------- Richview	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
7C2, 7C3, 7D2, 7D3- Atlas	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
8F, 8F2------------ Hickory	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
8G----------------- Hickory	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
12----------------- Wynoose	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
13A---------------- Bluford	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
13B2--------------- Bluford	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
14B, 14C2---------- Ava	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
48----------------- Ebbert	Poor	Fair	Fair	Poor	Poor	Good	Good	Fair	Poor	Good.
109---------------- Racoon	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
120---------------- Huey	Poor	Poor	Poor	Fair	Fair	Good	Good	Poor	Fair	Good.
131B--------------- Alvin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
131C2-------------- Alvin	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
131E2-------------- Alvin	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
138---------------- Shiloh	Fair	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
178---------------- Ruark	Fair	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
184 Roby	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
212B, 212C2 Thebes	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
218 Newberry	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
424 Shoals	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
533*. Urban land										
581B2 Tamalco	Good	Good	Fair	Good	Good	Poor	Poor	Good	Good	Poor.
620A Darmstadt	Fair	Good	Poor	Good	Good	Fair	Fair	Fair	Good	Fair.
620B2 Darmstadt	Fair	Good	Poor	Good	Good	Fair	Poor	Fair	Good	Poor.
779D Chelsea	Very poor.	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
805C*. Orthents										
866*. Dumps										
967F*:										
Hickory	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Gosport	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
967G*:										
Hickory	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Gosport	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
991*:										
Cisne	Fair	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
Huey	Poor	Poor	Poor	Fair	Fair	Good	Good	Poor	Fair	Good.
3071 Darwin	Poor	Poor	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.
3288 Petrolia	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
3304 Landes	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
3331--------------- Haymond	Good	Good	Fair	Good	Good	Poor	Poor	Good	Good	Poor.
3333--------------- Wakeland	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
7071--------------- Darwin	Fair	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Fair.
7288--------------- Petrolia	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
7304--------------- Landes	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
7331--------------- Haymond	Good	Good	Fair	Good	Good	Poor	Poor	Good	Good	Poor.
7333--------------- Wakeland	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
2----------------- Cisne	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
3B, 3B2----------- Hoyleton	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
4B---------------- Richview	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
4C2--------------- Richview	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
7C2, 7C3---------- Atlas	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength.	Moderate: wetness.
7D2, 7D3---------- Atlas	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: wetness, slope.
8F, 8F2, 8G------- Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
12---------------- Wynoose	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
13A, 13B2--------- Bluford	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
14B--------------- Ava	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Moderate: wetness.
14C2-------------- Ava	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Moderate: wetness.
48---------------- Ebbert	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
109---------------- Racoon	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding.
120---------------- Huey	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: excess sodium, ponding.
131B--------------- Alvin	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Moderate: droughty.
131C2-------------- Alvin	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: droughty, slope.
131E2-------------- Alvin	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
138---------------- Shiloh	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
178---------------- Ruark	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
184---------------- Roby	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness, droughty.
212B--------------- Thebes	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
212C2-------------- Thebes	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
218---------------- Newberry	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
424---------------- Shoals	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.	Severe: wetness, flooding.
533*. Urban land						
581B2-------------- Tamalco	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Severe: excess sodium.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
620A, 620B2------- Darmstadt	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Severe: excess sodium.
779D-------------- Chelsea	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
805C*. Orthents						
866*. Dumps						
967F*, 967G*: Hickory-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Gosport-----------	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
991*: Cisne-------------	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
Huey--------------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: excess sodium, ponding.
3071-------------- Darwin	Severe: ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding, flooding, too clayey.
3288-------------- Petrolia	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.
3304-------------- Landes	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
3331-------------- Haymond	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action.	Severe: flooding.
3333-------------- Wakeland	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.
7071-------------- Darwin	Severe: ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, shrink-swell.	Severe: ponding, too clayey.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
7288: Petrolia	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding.	Severe: ponding.
7304: Landes	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Moderate: small stones.
7331: Haymond	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: frost action.	Slight.
7333: Wakeland	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: frost action.	Moderate: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
2. Cisne	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
3B, 3B2. Hoyleton	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
4B. Richview	Moderate: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
4C2. Richview	Moderate: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
7C2, 7C3, 7D2, 7D3. Atlas	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
8F, 8F2, 8G. Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
12. Wynoose	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
13A. Bluford	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
13B2. Bluford	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
14B. Ava	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey, wetness.
14C2. Ava	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey, wetness.
48. Ebbert	Severe: ponding, percs slowly.	Slight	Severe: ponding.	Severe: ponding.	Poor: hard to pack, ponding.
109. Racoon	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
120-----------------Huey	Severe: ponding, percs slowly.	Slight-----------	Severe: ponding, too clayey, excess sodium.	Severe: ponding.	Poor: too clayey, ponding, excess sodium.
131B----------------Alvin	Moderate: percs slowly.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage.
131C2---------------Alvin	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage.
131E2---------------Alvin	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, slope.
138-----------------Shiloh	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
178-----------------Ruark	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
184-----------------Roby	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
212B----------------Thebes	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
212C2---------------Thebes	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
218-----------------Newberry	Severe: wetness, percs slowly.	Slight-----------	Severe: wetness.	Severe: wetness.	Poor: hard to pack, wetness.
424-----------------Shoals	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
533*. Urban land					
581B2---------------Tamalco	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, excess sodium.	Severe: wetness.	Poor: excess sodium.
620A----------------Darmstadt	Severe: wetness, percs slowly.	Slight-----------	Severe: wetness, excess sodium.	Severe: wetness.	Poor: wetness, excess sodium.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
620B2: Darmstadt	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, excess sodium.	Severe: wetness.	Poor: wetness, excess sodium.
779D: Chelsea	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
805C*. Orthents					
866*. Dumps					
967F*, 967G*:					
Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Gosport	Severe: thin layer, seepage, percs slowly.	Severe: seepage, slope.	Severe: seepage, slope, too clayey.	Severe: slope.	Poor: area reclaim, hard to pack, slope.
991*:					
Cisne	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Huey	Severe: ponding, percs slowly.	Slight	Severe: ponding, too clayey, excess sodium.	Severe: ponding.	Poor: too clayey, ponding, excess sodium.
3071: Darwin	Severe: flooding, ponding, percs slowly.	Severe: flooding.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.
3288: Petrolia	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.
3304: Landes	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy.
3331: Haymond	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
3333: Wakeland	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
7071: Darwin	Severe: ponding, percs slowly.	Slight	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
7288----------------- Petrolia	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
7304----------------- Landes	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
7331----------------- Haymond	Moderate: flooding.	Moderate: seepage.	Moderate: flooding.	Moderate: flooding.	Good.
7333----------------- Wakeland	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
2 Cisne	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
3B, 3B2 Hoyleton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
4B, 4C2 Richview	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
7C2, 7C3, 7D2, 7D3 Atlas	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
8F, 8F2 Hickory	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
8G Hickory	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
12 Wynoose	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
13A, 13B2 Bluford	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
14B, 14C2 Ava	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
48 Ebbert	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
109 Racoon	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
120 Huey	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess sodium.
131B, 131C2 Alvin	Good	Probable	Improbable: too sandy.	Poor: too sandy.
131E2 Alvin	Fair: slope.	Probable	Improbable: too sandy.	Poor: too sandy, slope.
138 Shiloh	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
178 Ruark	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
184: Roby	Fair: wetness.	Probable	Improbable: too sandy.	Poor: thin layer.
212B, 212C2: Thebes	Good	Probable	Improbable: too sandy.	Fair: area reclaim, too clayey.
218: Newberry	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
424: Shoals	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
533*. Urban land				
581B2: Tamalco	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, excess sodium.
620A, 620B2: Darmstadt	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
779D: Chelsea	Good	Probable	Improbable: too sandy.	Poor: too sandy.
805C*. Orthents				
866*. Dumps				
967F*:				
Hickory	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Gosport	Poor: area reclaim, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
967G*:				
Hickory	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Gosport	Poor: area reclaim, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
991*:				
Cisne	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
Huey	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess sodium.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
3071 Darwin	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey.
3288 Petrolia	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
3304 Landes	Good	Probable	Improbable: too sandy.	Fair: too sandy, small stones, thin layer.
3331 Haymond	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
3333 Wakeland	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
7071 Darwin	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
7288 Petrolia	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
7304 Landes	Good	Probable	Improbable: too sandy.	Fair: too sandy, small stones, thin layer.
7331 Haymond	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
7333 Wakeland	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
2----- Cisne	Slight-----	Severe: wetness.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
3B----- Hoyleton	Slight-----	Severe: wetness.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
3B2----- Hoyleton	Moderate: slope.	Severe: wetness.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
4B, 4C2----- Richview	Moderate: seepage, slope.	Slight-----	Deep to water	Slope-----	Erodes easily	Erodes easily.
7C2, 7C3----- Atlas	Moderate: slope.	Severe: hard to pack.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Wetness, erodes easily.
7D2, 7D3----- Atlas	Severe: slope.	Severe: hard to pack.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Wetness, slope, erodes easily.
8F, 8F2, 8G----- Hickory	Severe: slope.	Moderate: thin layer.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
12----- Wynoose	Slight-----	Severe: wetness.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
13A----- Bluford	Slight-----	Severe: piping.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
13B2----- Bluford	Moderate: slope.	Severe: piping.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
14B, 14C2----- Ava	Moderate: seepage, slope.	Severe: piping.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, rooting depth.
48----- Ebbert	Slight-----	Severe: ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
109----- Racoon	Slight-----	Severe: thin layer, ponding.	Ponding, percs slowly, flooding.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
120----- Huey	Slight-----	Severe: ponding, excess sodium.	Ponding, percs slowly, frost action.	Ponding, droughty, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, excess sodium, erodes easily.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
131B-------------- Alvin	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty.	Soil blowing---	Droughty, rooting depth.
131C2, 131E2------ Alvin	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty.	Slope, soil blowing.	Slope, droughty, rooting depth.
138--------------- Shiloh	Slight---------	Severe: ponding.	Ponding, frost action.	Ponding--------	Ponding--------	Wetness.
178--------------- Ruark	Moderate: seepage.	Severe: piping, ponding.	Ponding, frost action.	Ponding, soil blowing.	Ponding--------	Wetness.
184--------------- Roby	Severe: seepage.	Severe: seepage, piping, wetness.	Frost action, cutbanks cave.	Wetness, droughty.	Wetness, too sandy, soil blowing.	Wetness, droughty, rooting depth.
212B, 212C2------- Thebes	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, rooting depth, erodes easily.	Erodes easily, too sandy.	Erodes easily, rooting depth.
218--------------- Newberry	Slight---------	Severe: wetness.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
424--------------- Shoals	Moderate: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
533*. Urban land						
581B2------------- Tamalco	Moderate: slope.	Severe: excess sodium.	Percs slowly, frost action, slope.	Slope, wetness.	Erodes easily, wetness, percs slowly.	Excess sodium, erodes easily.
620A-------------- Darmstadt	Slight---------	Severe: excess sodium.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness.	Wetness, excess sodium.
620B2------------- Darmstadt	Moderate: slope.	Severe: excess sodium.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Wetness, excess sodium.
779D-------------- Chelsea	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.	Slope, droughty.
805C*. Orthents						
866*. Dumps						
967F*, 967G*:						
Hickory----------	Severe: slope.	Moderate: thin layer.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
967F*, 967G*:						
Gosport	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, percs slowly, thin layer.	Slope, area reclaim, erodes easily.	Slope, erodes easily, area reclaim.
991*:						
Cisne	Slight	Severe: wetness.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Huey	Slight	Severe: ponding, excess sodium.	Ponding, percs slowly, frost action.	Ponding, droughty, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, excess sodium, erodes easily.
3071 Darwin	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly, flooding.	Ponding, slow intake, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
3288 Petrolia	Slight	Severe: ponding.	Ponding, flooding, frost action.	Ponding, flooding.	Ponding	Wetness.
3304 Landes	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing.	Too sandy, soil blowing.	Droughty.
3331 Haymond	Moderate: seepage.	Severe: piping.	Deep to water	Flooding, erodes easily.	Erodes easily	Erodes easily.
3333 Wakeland	Moderate: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
7071 Darwin	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly.	Ponding, slow intake, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
7288 Petrolia	Slight	Severe: ponding.	Ponding, frost action.	Ponding	Ponding	Wetness.
7304 Landes	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing.	Too sandy, soil blowing.	Droughty.
7331 Haymond	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
7333 Wakeland	Moderate: seepage.	Severe: piping, wetness.	Frost action	Wetness, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
2 Cisne	0-8	Silt loam	CL, CL-ML, ML	A-4	0	100	100	90-100	90-100	25-35	5-10
	8-17	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-35	5-15
	17-37	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	90-100	90-100	45-60	20-35
	37-60	Silty clay loam, sandy loam, silt loam.	CL	A-6, A-7	0-5	100	90-100	70-95	50-90	30-50	15-30
	60-70	Silt loam, loam, clay loam.	CL	A-6	0-5	100	90-100	70-95	50-90	25-40	10-25
3B Hoyleton	0-15	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	95-100	85-100	25-35	5-15
	15-34	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	95-100	85-100	40-55	20-30
	34-60	Silt loam, loam, silty clay loam.	CL, CL-ML	A-6, A-7, A-4	0	100	95-100	90-100	70-95	20-45	5-25
3B2 Hoyleton	0-7	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	95-100	85-100	25-35	5-15
	7-39	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	95-100	85-100	40-55	20-30
	39-60	Silt loam, silty clay loam, clay loam.	CL, CL-ML	A-6, A-7, A-4	0	100	95-100	90-100	70-95	20-45	5-25
4B Richview	0-12	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-35	5-15
	12-38	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	35-50	15-30
	38-60	Silt loam, loam, clay loam.	CL	A-6, A-7	0	100	90-100	90-100	70-95	25-45	10-20
4C2 Richview	0-7	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-35	5-15
	7-33	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	35-50	15-30
	33-60	Silt loam, loam, clay loam.	CL	A-6, A-7	0	100	90-100	90-100	70-95	25-45	10-20
7C2 Atlas	0-6	Silt loam	CL, CL-ML	A-6, A-4	0	100	100	95-100	75-95	25-35	5-15
	6-36	Silty clay loam, silty clay, clay loam.	CH	A-7	0	100	95-100	95-100	75-95	50-70	30-45
	36-45	Silty clay loam, silty clay, clay loam.	CH	A-7	0	100	95-100	95-100	75-95	50-70	30-45
	45-60	Clay loam, clay	CH, CL	A-6, A-7	0	95-100	90-100	90-100	65-95	35-55	20-30
7C3 Atlas	0-5	Silty clay loam	CH, CL	A-7	0	100	100	95-100	75-100	40-60	25-40
	5-25	Silty clay loam, silty clay, clay loam.	CH	A-7	0	100	95-100	95-100	75-95	50-70	30-45
	25-51	Silty clay loam, silty clay, clay loam.	CH	A-7	0	100	95-100	95-100	75-95	50-70	30-45
	51-60	Clay loam, clay	CH, CL	A-6, A-7	0	95-100	90-100	90-100	65-95	35-55	20-30

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
7D2--------------	0-6	Silt loam--------	CL, CL-ML	A-6, A-4	0	100	100	95-100	75-95	25-35	5-15
Atlas	6-25	Silty clay loam, silty clay, clay loam.	CH	A-7	0	100	95-100	95-100	75-95	50-70	30-45
	25-44	Silty clay loam, silty clay, clay loam.	CH	A-7	0	100	95-100	95-100	75-95	50-70	30-45
	44-60	Clay loam, clay	CH, CL	A-6, A-7	0	95-100	90-100	90-100	65-95	35-55	20-30
7D3--------------	0-6	Silty clay loam	CH, CL	A-7	0	100	100	95-100	75-100	40-60	25-40
Atlas	6-36	Silty clay loam, clay, clay loam.	CH	A-7	0	100	95-100	95-100	75-95	50-70	30-45
	36-60	Silty clay loam, silty clay, clay loam.	CH	A-7	0	100	95-100	95-100	75-95	50-70	30-45
8F---------------	0-15	Loam-------------	CL, ML, CL-ML	A-6, A-4	0-5	95-100	90-100	90-100	75-95	20-35	3-15
Hickory											
	15-38	Clay loam, silty clay loam, loam.	CL	A-6, A-7	0-5	95-100	75-100	70-95	65-80	30-50	15-30
	38-60	Sandy loam, loam, clay loam.	CL-ML, CL	A-4, A-6	0-5	85-100	75-95	70-95	60-80	20-40	5-20
8F2--------------	0-3	Loam-------------	CL	A-6, A-4	0-5	95-100	90-100	90-100	75-95	20-35	8-15
Hickory	3-48	Clay loam, silty clay loam, loam.	CL	A-6, A-7	0-5	95-100	75-100	70-95	65-80	30-50	15-30
	48-60	Sandy loam, loam, clay loam.	CL-ML, CL	A-4, A-6	0-5	85-100	75-95	70-95	60-80	20-40	5-20
8G---------------	0-15	Loam-------------	CL, ML, CL-ML	A-6, A-4	0-5	95-100	90-100	90-100	75-95	20-35	3-15
Hickory											
	15-38	Clay loam, silty clay loam, loam.	CL	A-6, A-7	0-5	95-100	75-100	70-95	65-80	30-50	15-30
	38-60	Sandy loam, loam, clay loam.	CL-ML, CL	A-4, A-6	0-5	85-100	75-95	70-95	60-80	20-40	5-20
12---------------	0-7	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	85-95	20-35	5-15
Wynoose	7-17	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	100	95-100	85-95	15-30	2-15
	17-36	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	85-95	40-55	20-35
	36-60	Silt loam, clay loam, silty clay loam.	CL	A-6, A-7	0	100	95-100	90-100	70-90	30-45	15-25
13A--------------	0-8	Silt loam--------	CL, CL-ML	A-6, A-4	0	100	95-100	95-100	90-100	20-35	5-15
Bluford	8-15	Silt loam--------	ML, CL-ML, CL	A-4	0	100	95-100	95-100	90-100	20-30	NP-10
	15-37	Silty clay loam, silty clay.	CL	A-7, A-6	0	100	95-100	95-100	90-100	35-50	15-30
	37-60	Silt loam, silty clay loam, clay loam.	CL-ML, CL	A-6, A-4	0-5	100	95-100	90-100	70-90	25-40	5-20
13B2-------------	0-7	Silt loam--------	CL, CL-ML	A-6, A-4	0	100	95-100	95-100	90-100	20-35	5-15
Bluford	7-35	Silty clay loam, silty clay.	CL	A-7, A-6	0	100	95-100	95-100	90-100	35-50	15-30
	35-60	Silt loam, silty clay loam, clay loam.	CL-ML, CL	A-6, A-4	0-5	100	95-100	90-100	70-90	25-40	5-20

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
14B-------------- Ava	0-9	Silt loam--------	CL, ML, CL-ML	A-6, A-4	0	100	100	95-100	90-100	25-35	5-15
	9-24	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	25-45	10-20
	24-36	Silty clay loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	90-100	25-45	10-20
	36-60	Silty clay loam, silt loam, loam.	CL, CL-ML, ML	A-4, A-6, A-7	0	100	95-100	90-100	80-90	20-45	5-20
14C2------------- Ava	0-7	Silt loam--------	CL, ML, CL-ML	A-6, A-4	0	100	100	95-100	90-100	25-35	5-15
	7-25	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	25-45	10-20
	25-60	Silty clay loam, silt loam, loam.	CL, CL-ML, ML	A-4, A-6, A-7	0	100	95-100	90-100	80-90	20-45	5-20
48--------------- Ebbert	0-12	Silt loam--------	CL	A-6	0	100	100	95-100	85-100	30-40	10-15
	12-18	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	85-100	25-35	7-15
	18-52	Silty clay loam, silt loam.	CL, CH	A-7	0	100	100	95-100	85-100	40-55	25-35
	52-60	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	95-100	95-100	80-100	30-50	10-30
109-------------- Racoon	0-6	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	90-100	20-40	8-20
	6-27	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	20-40	5-20
	27-60	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-100	35-50	15-30
120-------------- Huey	0-9	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	85-95	20-35	3-15
	9-15	Silt, silt loam	CL, ML, CL-ML	A-6, A-4	0	100	100	90-100	85-95	15-30	3-15
	15-21	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	95-100	90-100	25-45	10-25
	21-45	Silt loam, silty clay loam, silty clay.	CL	A-6, A-7	0	100	100	95-100	90-100	30-50	15-30
	45-60	Loam, silt loam, silty clay loam.	CL	A-6	0	95-100	90-100	80-95	65-90	20-35	10-20
131B------------- Alvin	0-7	Fine sandy loam	SM, ML	A-4, A-2	0	100	100	80-95	30-60	<25	NP-4
	7-13	Very fine sandy loam, sandy loam, loamy fine sand.	SM, ML	A-2, A-4	0	100	100	80-95	30-60	<25	NP-4
	13-34	Fine sandy loam, sandy loam, loam.	SM, SC, CL, ML	A-2, A-4, A-6	0	100	100	70-100	20-80	15-40	NP-15
	34-60	Very fine sand, sandy loam, loamy sand.	SP, SP-SM, SM	A-2, A-3, A-1	0	95-100	90-100	45-95	4-35	<20	NP-4
131C2, 131E2----- Alvin	0-7	Fine sandy loam	SM, ML	A-4, A-2	0	100	100	80-95	30-60	<25	NP-4
	7-27	Fine sandy loam, sandy loam, loam.	SM, SC, CL, ML	A-2, A-4, A-6	0	100	100	70-100	20-80	15-40	NP-15
	27-60	Very fine sand, fine sandy loam, loamy fine sand.	SP, SP-SM, SM	A-2, A-3, A-1	0	95-100	90-100	45-95	4-35	<20	NP-4

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
138-------------- Shiloh	0-16	Silty clay loam	CL	A-7	0	100	100	95-100	90-100	40-50	15-25
	16-59	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-100	40-65	15-40
	59-65	Silty clay loam, silty clay, silt loam.	CL	A-7, A-6	0	100	100	95-100	90-100	30-50	15-30
178-------------- Ruark	0-13	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4	0	100	100	90-100	40-60	<25	NP-7
	13-46	Loam, clay loam, sandy clay loam.	CL-ML, CL	A-6, A-4	0	100	100	95-100	55-70	25-40	5-15
	46-60	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, ML, CL-ML	A-4	0	100	90-100	90-100	40-75	<25	NP-7
184-------------- Roby	0-9	Fine sandy loam	SM, SM-SC	A-4	0	95-100	95-100	85-95	35-50	<25	NP-7
	9-15	Loamy fine sand, fine sand, fine sandy loam.	SM, SM-SC	A-4, A-2	0	90-100	90-100	65-90	20-50	<20	NP-7
	15-23	Fine sandy loam, sandy loam, loam.	SM, ML	A-4, A-2	0	90-100	90-100	85-95	30-75	20-34	NP-7
	23-60	Sand, loamy sand, sandy loam.	SM, SM-SC, SP-SM, ML	A-4, A-2	0	80-100	75-90	50-90	10-65	<20	NP-7
212B------------- Thebes	0-12	Silt loam--------	CL	A-4, A-6	0	100	100	100	90-100	25-40	8-20
	12-35	Silt loam, fine sandy loam, clay loam.	SM, SC, CL, ML	A-4, A-6	0	100	100	90-100	40-70	15-30	NP-13
	35-60	Fine sand, loamy fine sand, sand.	SP, SM, SP-SM	A-2, A-3	0	100	90-100	75-95	4-35	<20	NP-4
212C2------------ Thebes	0-6	Silt loam--------	CL	A-4, A-6	0	100	100	100	90-100	25-40	8-20
	6-28	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	100	100	90-100	30-45	15-30
	28-37	Loam, fine sandy loam, sandy clay loam.	SM, SC, CL, ML	A-4, A-6	0	100	100	90-100	40-70	15-30	NP-13
	37-60	Fine sand, loamy fine sand, sand.	SP, SM, SP-SM	A-2, A-3	0	100	90-100	75-95	4-35	<20	NP-4
218-------------- Newberry	0-8	Silt loam--------	CL	A-6	0	100	100	95-100	85-100	30-40	10-20
	8-14	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	85-100	30-40	8-15
	14-55	Silty clay loam	CL, CH	A-7, A-6	0	100	100	95-100	85-100	35-55	15-30
	55-60	Silty clay loam, clay loam, loam.	CL	A-7, A-6	0-5	95-100	90-100	75-100	50-90	30-45	15-25
424-------------- Shoals	0-11	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	65-90	20-35	6-15
	11-60	Stratified silt loam to sandy loam.	ML, CL, CL-ML	A-4	0-3	90-100	85-100	60-80	50-70	<30	4-10
533*. Urban land											

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
581B2------------ Tamalco	0-7	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	7-24	Silty clay loam, silty clay.	CH	A-7	0	100	100	95-100	95-100	55-75	35-45
	24-31	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	95-100	30-50	15-25
	31-60	Silt loam, loam, clay loam.	CL	A-6	0	100	100	95-100	80-100	30-40	15-25
620A------------- Darmstadt	0-15	Silt loam--------	CL, ML, CL-ML	A-6, A-7, A-4	0	95-100	95-100	95-100	75-100	25-45	5-20
	15-44	Silty clay loam, silty clay.	CL, CH	A-7	0	100	95-100	95-100	90-100	40-65	20-40
	44-53	Silty clay loam, clay loam, silt loam.	CL, CH	A-7	0	100	95-100	95-100	90-100	40-65	20-40
	53-60	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0	95-100	95-100	90-100	75-100	20-50	7-30
620B2------------ Darmstadt	0-5	Silt loam--------	CL, ML, CL-ML	A-6, A-7, A-4	0	95-100	95-100	95-100	75-100	25-45	5-20
	5-21	Silty clay loam, silty clay.	CL, CH	A-7	0	100	95-100	95-100	90-100	40-65	20-40
	21-32	Silty clay loam, silty clay.	CL, CH	A-7	0	100	95-100	95-100	90-100	40-65	20-40
	32-60	Silt loam, silty clay loam, clay loam.	CL	A-6, A-7, A-4	0	95-100	95-100	90-100	75-100	20-50	7-30
779D------------- Chelsea	0-6	Loamy fine sand	SM, SP-SM	A-2-4	0	100	100	65-95	10-35	---	NP
	6-60	Fine sand, sand, loamy sand.	SP, SM, SW-SM	A-3, A-2-4	0	100	100	65-95	3-15	---	NP
805C*. Orthents											
866*. Dumps											
967F*, 967G*:											
Hickory---------	0-10	Loam-------------	CL, ML, CL-ML	A-6, A-4	0-5	95-100	90-100	90-100	75-95	20-35	3-15
	10-43	Clay loam, silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-5	95-100	75-100	70-95	65-80	30-50	15-30
	43-60	Sandy loam, loam, gravelly clay loam.	CL-ML, CL	A-4, A-6	0-5	85-100	75-95	70-95	60-80	20-40	5-20
Gosport---------	0-7	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	90-100	90-100	70-100	25-40	5-15
	7-32	Clay, silty clay, silty clay loam.	CH	A-7	0	100	90-100	90-100	85-100	50-65	35-50
	32-60	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
991*:											
Cisne-----------	0-8	Silt loam--------	CL, CL-ML, ML	A-4	0	100	100	90-100	90-100	25-35	5-10
	8-17	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-35	5-15
	17-48	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	90-100	90-100	45-60	20-35
	48-60	Silty clay loam, sandy loam, silt loam.	CL	A-6, A-7	0-5	100	90-100	70-95	50-90	30-50	15-30
	60-70	Silt loam, loam, clay loam.	CL	A-6	0-5	100	90-100	70-95	50-90	25-40	10-25
Huey------------	0-9	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	85-95	20-35	3-15
	9-12	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	95-100	90-100	25-45	10-25
	12-46	Silt loam, silty clay loam, silty clay.	CL	A-6, A-7	0	100	100	95-100	90-100	30-50	15-30
	46-60	Loam, silt loam, silty clay loam.	CL	A-6	0	95-100	90-100	80-95	65-90	20-35	10-20
3071------------- Darwin	0-11	Silty clay-------	CH, CL	A-7	0	100	100	100	90-100	45-85	25-55
	11-44	Silty clay, clay	CH, CL	A-7	0	100	100	100	85-100	45-85	25-55
	44-60	Silty clay loam, silty clay.	CL, CH	A-7, A-6	0	100	100	95-100	90-100	35-70	20-45
3288------------- Petrolia	0-6	Silty clay loam	CL	A-6, A-7	0	100	95-100	90-100	80-100	30-45	10-20
	6-60	Silty clay loam	CL	A-6, A-7	0	100	95-100	90-100	80-100	35-45	15-25
3304------------- Landes	0-12	Fine sandy loam	SM, SC, SM-SC	A-4, A-2-4	0	100	70-100	70-95	20-50	<25	NP-10
	12-41	Fine sandy loam, very fine sandy loam, loamy fine sand.	SM, CL-ML, SC, SM-SC	A-4, A-2-4	0	100	85-100	70-100	15-60	<25	NP-10
	41-60	Stratified sand to silt loam.	SM, SP-SM, SC, SM-SC	A-4, A-2-4	0	100	85-100	70-85	10-50	<30	NP-10
3331------------- Haymond	0-9	Silt loam--------	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
	9-42	Silt loam--------	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
	42-60	Fine sandy loam, silt loam, very fine sandy loam.	SM, ML	A-4	0	95-100	90-100	80-100	35-90	27-36	4-10
3333------------- Wakeland	0-9	Silt loam--------	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
	9-60	Silt loam--------	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
7071------------- Darwin	0-13	Silty clay-------	CH, CL	A-7	0	100	100	100	90-100	45-85	25-55
	13-48	Silty clay, clay	CH, CL	A-7	0	100	100	100	85-100	45-85	25-55
	48-60	Silty clay loam, silty clay.	CL, CH	A-7, A-6	0	100	100	95-100	90-100	35-70	20-45
7288------------- Petrolia	0-8	Silty clay loam	CL	A-6, A-7	0	100	95-100	90-100	80-100	30-45	10-20
	8-60	Silty clay loam	CL	A-6, A-7	0	100	95-100	90-100	80-100	35-45	15-25

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
7304------------- Landes	0-12	Fine sandy loam	SM, SC, SM-SC	A-4, A-2-4	0	100	70-100	70-95	20-50	<25	NP-10
	12-41	Loam, very fine sandy loam, loamy fine sand.	SM, CL-ML, SC, SM-SC	A-4, A-2-4	0	100	85-100	70-100	15-60	<25	NP-10
	41-60	Stratified sand to silt loam.	SM, SP-SM, SC, SM-SC	A-4, A-2-4	0	100	85-100	70-85	10-50	<30	NP-10
7331------------- Haymond	0-9	Silt loam--------	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
	9-42	Silt loam--------	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
	42-60	Fine sandy loam, silt loam, loam.	SM, ML	A-4	0	95-100	90-100	80-100	35-90	27-36	4-10
7333------------- Wakeland	0-9	Silt loam--------	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
	9-60	Silt loam--------	ML	A-4	0	100	100	90-100	80-90	27-36	4-10

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
2---------------- Cisne	0-8	15-27	1.30-1.50	0.06-2.0	0.22-0.24	4.5-7.8	Low-----------	0.37	3	6	1-3
	8-17	15-27	1.25-1.45	0.06-0.2	0.18-0.20	4.5-6.0	Low-----------	0.37			
	17-37	35-45	1.40-1.60	<0.06	0.09-0.15	4.5-6.0	High----------	0.37			
	37-60	25-37	1.50-1.70	<0.06	0.08-0.14	5.1-6.5	Moderate-----	0.37			
	60-70	22-30	1.60-1.80	<0.06	0.14-0.22	5.6-7.3	Moderate-----	0.37			
3B--------------- Hoyleton	0-15	20-27	1.30-1.50	0.6-2.0	0.22-0.24	4.5-7.3	Moderate-----	0.32	3	6	1-3
	15-34	35-45	1.40-1.65	0.06-0.2	0.13-0.20	4.5-5.5	High----------	0.43			
	34-60	15-33	1.35-1.70	0.06-0.2	0.17-0.22	5.1-7.3	Moderate-----	0.43			
3B2-------------- Hoyleton	0-7	20-27	1.30-1.50	0.6-2.0	0.22-0.24	4.5-7.3	Moderate-----	0.32	3	6	.5-1
	7-39	35-45	1.40-1.65	0.06-0.2	0.13-0.20	4.5-5.5	High----------	0.43			
	39-60	15-33	1.35-1.70	0.06-0.2	0.17-0.22	5.1-7.3	Moderate-----	0.43			
4B--------------- Richview	0-12	20-27	1.20-1.40	0.6-2.0	0.22-0.24	5.1-7.3	Low-----------	0.32	5	6	1-3
	12-38	25-35	1.30-1.50	0.6-2.0	0.18-0.20	4.5-6.5	Moderate-----	0.43			
	38-60	22-35	1.50-1.70	0.6-2.0	0.14-0.20	4.5-6.5	Moderate-----	0.43			
4C2-------------- Richview	0-7	20-27	1.20-1.40	0.6-2.0	0.22-0.24	5.1-7.3	Low-----------	0.32	5	6	.5-1
	7-33	25-35	1.30-1.50	0.6-2.0	0.18-0.20	4.5-6.5	Moderate-----	0.43			
	33-60	22-35	1.50-1.70	0.6-2.0	0.14-0.20	4.5-6.5	Moderate-----	0.43			
7C2-------------- Atlas	0-6	20-27	1.30-1.50	0.2-0.6	0.20-0.24	4.5-7.3	Moderate-----	0.43	3	6	1-3
	6-36	35-45	1.50-1.70	<0.06	0.09-0.13	4.5-7.3	High----------	0.32			
	36-45	30-45	1.50-1.70	<0.06	0.09-0.13	4.5-7.8	High----------	0.32			
	45-60	20-30	1.55-1.80	0.06-0.2	0.12-0.15	6.1-7.8	Moderate-----	0.32			
7C3-------------- Atlas	0-5	30-40	1.40-1.60	0.06-0.2	4.5-7.3	4.5-7.3	High----------	0.43	2	7	.5-1
	5-25	35-45	1.50-1.70	<0.06	0.09-0.13	4.5-7.3	High----------	0.32			
	25-51	30-45	1.50-1.70	<0.06	0.09-0.13	4.5-7.8	High----------	0.32			
	51-60	20-30	1.55-1.80	0.06-0.2	0.12-0.15	6.1-7.8	Moderate-----	0.32			
7D2-------------- Atlas	0-6	20-27	1.30-1.50	0.2-0.6	0.20-0.24	4.5-7.3	Moderate-----	0.43	3	6	1-3
	6-25	35-45	1.50-1.70	<0.06	0.09-0.13	4.5-7.3	High----------	0.32			
	25-44	30-45	1.50-1.70	<0.06	0.09-0.13	4.5-7.8	High----------	0.32			
	44-60	20-30	1.55-1.80	0.06-0.2	0.12-0.15	6.1-7.8	Moderate-----	0.32			
7D3-------------- Atlas	0-6	30-40	1.40-1.60	0.06-0.2	4.5-7.3	4.5-7.3	High----------	0.43	2	7	.5-1
	6-36	35-45	1.50-1.70	<0.06	0.09-0.13	4.5-7.3	High----------	0.32			
	36-60	30-45	1.50-1.70	<0.06	0.09-0.13	4.5-7.8	High----------	0.32			
8F--------------- Hickory	0-15	19-25	1.30-1.50	0.6-2.0	0.20-0.22	4.5-7.3	Low-----------	0.37	5	6	1-2
	15-38	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-6.0	Moderate-----	0.37			
	38-60	15-32	1.50-1.70	0.6-2.0	0.11-0.19	5.1-8.4	Low-----------	0.37			
8F2-------------- Hickory	0-3	19-25	1.30-1.50	0.6-2.0	0.20-0.22	4.5-7.3	Low-----------	0.37	5	6	.5-1
	3-48	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-6.0	Moderate-----	0.37			
	48-60	15-32	1.50-1.70	0.6-2.0	0.11-0.19	5.1-8.4	Low-----------	0.37			
8G--------------- Hickory	0-15	19-25	1.30-1.50	0.6-2.0	0.20-0.22	4.5-7.3	Low-----------	0.37	5	6	1-2
	15-38	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-6.0	Moderate-----	0.37			
	38-60	15-32	1.50-1.70	0.6-2.0	0.11-0.19	5.1-8.4	Low-----------	0.37			
12--------------- Wynoose	0-7	15-25	1.25-1.45	0.6-2.0	0.22-0.24	4.5-7.8	Low-----------	0.43	3	6	.5-1
	7-17	12-18	1.30-1.50	0.06-0.2	0.18-0.20	3.6-7.3	Low-----------	0.43			
	17-36	35-42	1.40-1.60	<0.06	0.09-0.13	3.6-6.0	High----------	0.43			
	36-60	25-37	1.50-1.70	0.06-0.2	0.11-0.15	3.6-6.0	Moderate-----	0.43			

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
13A--------------	0-8	20-27	1.30-1.50	0.6-2.0	0.22-0.24	4.5-7.3	Low-----------	0.43	3	6	1-3
Bluford	8-15	15-25	1.40-1.60	0.2-0.6	0.18-0.20	4.5-6.0	Low-----------	0.43			
	15-37	35-42	1.45-1.65	0.06-0.6	0.11-0.20	4.5-5.5	Moderate------	0.43			
	37-60	22-35	1.60-1.70	0.06-0.2	0.11-0.16	4.5-6.5	Moderate------	0.43			
13B2-------------	0-7	20-27	1.30-1.50	0.6-2.0	0.22-0.24	4.5-7.3	Low-----------	0.43	3	6	.5-1
Bluford	7-35	35-42	1.45-1.65	0.06-0.6	0.11-0.20	4.5-5.5	Moderate------	0.43			
	35-60	22-35	1.60-1.70	0.06-0.2	0.11-0.16	4.5-6.5	Moderate------	0.43			
14B--------------	0-9	20-27	1.30-1.50	0.6-2.0	0.20-0.23	4.5-7.3	Low-----------	0.43	4	6	.5-2
Ava	9-24	22-33	1.40-1.60	0.6-2.0	0.18-0.21	4.5-5.5	Moderate------	0.43			
	24-36	24-35	1.50-1.70	0.2-0.6	0.18-0.21	4.5-5.5	Moderate------	0.43			
	36-60	20-30	1.55-1.80	<0.06	0.09-0.11	4.5-5.5	Low-----------	0.43			
14C2-------------	0-7	20-27	1.30-1.50	0.6-2.0	0.20-0.23	4.5-7.3	Low-----------	0.43	4	6	.5-1
Ava	7-25	22-33	1.40-1.60	0.6-2.0	0.18-0.21	4.5-5.5	Moderate------	0.43			
	25-60	20-30	1.55-1.80	<0.06	0.09-0.11	4.5-5.5	Low-----------	0.43			
48---------------	0-12	20-27	1.20-1.40	0.2-0.6	0.22-0.24	5.1-7.3	Low-----------	0.32	5	6	2-3
Ebbert	12-18	18-25	1.30-1.50	0.2-0.6	0.20-0.22	5.1-6.0	Low-----------	0.43			
	18-52	24-35	1.35-1.55	0.06-0.2	0.18-0.20	4.5-7.3	Moderate------	0.43			
	52-60	22-33	1.50-1.70	0.06-0.2	0.14-0.20	5.6-7.3	Moderate------	0.43			
109--------------	0-6	20-27	1.30-1.50	0.2-0.6	0.22-0.24	4.5-7.3	Moderate------	0.37	3	6	1-2
Racoon	6-27	18-25	1.35-1.50	0.2-0.6	0.20-0.22	3.6-7.3	Moderate------	0.37			
	27-60	27-35	1.35-1.60	0.06-0.2	0.18-0.20	3.6-5.5	High----------	0.37			
120--------------	0-9	15-27	1.35-1.50	0.2-0.6	0.22-0.24	5.1-7.8	Low-----------	0.43	3	6	1-3
Huey	9-15	11-25	1.40-1.55	0.06-0.2	0.20-0.22	5.1-7.8	Low-----------	0.43			
	15-21	20-35	1.40-1.60	0.06-0.2	0.10-0.18	5.6-8.4	Moderate------	0.43			
	21-45	25-35	1.45-1.65	<0.06	0.05-0.08	7.4-9.0	Moderate------	0.43			
	45-60	18-35	1.55-1.75	0.06-0.2	0.10-0.15	6.6-8.4	Moderate------	0.43			
131B-------------	0-7	10-15	1.45-1.65	2.0-6.0	0.14-0.20	4.5-7.3	Low-----------	0.24	5	3	.5-1
Alvin	7-13	10-15	1.45-1.65	0.6-6.0	0.14-0.20	4.5-6.0	Low-----------	0.24			
	13-34	15-18	1.45-1.65	0.6-6.0	0.12-0.20	4.5-6.0	Low-----------	0.24			
	34-60	3-10	1.55-1.75	2.0-6.0	0.05-0.13	5.1-8.4	Low-----------	0.24			
131C2, 131E2-----	0-7	10-15	1.45-1.65	2.0-6.0	0.14-0.20	4.5-7.3	Low-----------	0.24	5	3	.5-1
Alvin	7-27	15-18	1.45-1.65	0.6-6.0	0.12-0.20	4.5-6.0	Low-----------	0.24			
	27-60	3-10	1.55-1.75	2.0-6.0	0.05-0.13	5.1-8.4	Low-----------	0.24			
138--------------	0-16	35-40	1.30-1.50	0.2-0.6	0.18-0.21	6.1-7.3	High----------	0.28	5	7	4-6
Shiloh	16-59	35-45	1.35-1.55	0.2-0.6	0.09-0.18	6.1-7.8	High----------	0.28			
	59-65	25-45	1.30-1.50	0.2-0.6	0.18-0.20	6.1-8.4	High----------	0.28			
178--------------	0-13	15-20	1.40-1.60	0.6-2.0	0.16-0.18	4.5-7.3	Low-----------	0.24	5	3	.5-2
Ruark	13-46	20-35	1.40-1.60	0.2-0.6	0.15-0.19	4.5-7.3	Low-----------	0.24			
	46-60	10-20	1.45-1.65	0.6-2.0	0.11-0.16	5.6-7.8	Low-----------	0.24			
184--------------	0-9	5-15	1.20-1.40	0.6-2.0	0.12-0.15	4.5-6.5	Low-----------	0.20	5	3	1-2
Roby	9-15	3-15	1.25-1.55	0.6-2.0	0.09-0.20	4.5-6.0	Low-----------	0.28			
	15-23	10-18	1.40-1.70	0.6-2.0	0.12-0.19	5.6-7.8	Low-----------	0.28			
	23-60	3-15	1.50-1.85	2.0-20	0.04-0.10	5.6-7.8	Low-----------	0.10			
212B-------------	0-12	18-27	1.15-1.35	0.6-2.0	0.22-0.24	5.6-6.5	Low-----------	0.37	4	6	1-2
Thebes	12-35	15-30	1.35-1.55	0.6-2.0	0.12-0.19	4.5-6.5	Low-----------	0.37			
	35-60	3-10	1.80-2.00	6.0-20	0.05-0.10	5.1-6.5	Low-----------	0.15			
212C2------------	0-6	18-27	1.15-1.35	0.6-2.0	0.22-0.24	5.6-6.5	Low-----------	0.37	4	6	.5-1
Thebes	6-28	25-35	1.30-1.50	0.6-2.0	0.18-0.20	4.5-6.5	Moderate------	0.37			
	28-37	15-30	1.35-1.55	0.6-2.0	0.12-0.19	4.5-6.5	Low-----------	0.37			
	37-60	3-10	1.80-2.00	6.0-20	0.05-0.10	5.1-6.5	Low-----------	0.15			

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
218------------ Newberry	0-8	20-27	1.25-1.50	0.2-0.6	0.22-0.24	5.6-7.3	Low----------	0.37	5	6	2-3
	8-14	18-25	1.30-1.55	0.2-0.6	0.20-0.22	4.5-6.0	Low----------	0.37			
	14-55	27-35	1.30-1.55	0.06-0.2	0.18-0.20	4.5-6.0	Moderate-----	0.37			
	55-60	22-33	1.50-1.70	0.06-0.2	0.14-0.20	4.5-7.3	Moderate-----	0.37			
424------------ Shoals	0-11	18-27	1.30-1.50	0.6-2.0	0.22-0.24	6.1-7.8	Low----------	0.37	5	6	1-2
	11-60	12-25	1.35-1.60	0.6-2.0	0.12-0.21	6.1-8.4	Low----------	0.37			
533*. Urban land											
581B2---------- Tamalco	0-7	20-27	1.30-1.50	0.6-2.0	0.22-0.24	4.5-7.8	Low----------	0.43	3	6	.5-1
	7-24	35-52	1.35-1.60	<0.06	0.09-0.14	4.5-7.3	High---------	0.43			
	24-31	20-35	1.50-1.70	<0.06	0.07-0.11	5.1-8.4	Moderate-----	0.43			
	31-60	20-30	1.55-1.75	<0.06	0.02-0.12	7.4-9.0	Moderate-----	0.43			
620A----------- Darmstadt	0-15	10-27	1.30-1.50	0.06-0.2	0.22-0.24	5.1-7.3	Low----------	0.43	3	6	.5-1
	15-44	27-42	1.40-1.65	0.06-0.2	0.11-0.20	4.5-7.8	Moderate-----	0.43			
	44-53	27-35	1.40-1.65	<0.06	0.09-0.10	6.6-9.0	Moderate-----	0.43			
	53-60	15-30	1.50-1.70	<0.06	0.10-0.15	7.4-9.0	Low----------	0.43			
620B2---------- Darmstadt	0-5	10-27	1.30-1.50	0.06-0.2	0.22-0.24	5.1-7.3	Low----------	0.43	3	6	.5-1
	5-21	27-35	1.40-1.65	0.06-0.2	0.11-0.20	4.5-7.8	Moderate-----	0.43			
	21-32	27-35	1.40-1.65	<0.06	0.09-0.10	6.6-9.0	Moderate-----	0.43			
	32-60	15-30	1.50-1.70	<0.06	0.10-0.15	7.4-9.0	Low----------	0.43			
779D----------- Chelsea	0-6	8-15	1.50-1.55	6.0-20	0.10-0.15	5.6-7.3	Low----------	0.17	5	2	.5-1
	6-60	5-10	1.55-1.70	6.0-20	0.06-0.08	5.1-6.5	Low----------	0.17			
805C*. Orthents											
866*. Dumps											
967F*, 967G*:											
Hickory---------	0-10	19-25	1.30-1.50	0.6-2.0	0.20-0.22	4.5-7.3	Low----------	0.37	5	6	1-2
	10-43	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-6.0	Moderate-----	0.37			
	43-60	15-32	1.50-1.70	0.6-2.0	0.11-0.19	5.1-8.4	Low----------	0.37			
Gosport---------	0-7	18-27	1.30-1.40	0.2-0.6	0.18-0.20	5.1-6.5	Low----------	0.43	3	6	1-2
	7-32	36-60	1.50-1.60	<0.06	0.12-0.14	3.6-5.5	High---------	0.32			
	32-60	---	---	---	---	---	-------------	----			
991*:											
Cisne-----------	0-8	15-27	1.30-1.50	0.06-2.0	0.22-0.24	4.5-7.8	Low----------	0.37	3	6	1-3
	8-17	15-27	1.25-1.45	0.06-0.2	0.18-0.20	4.5-6.0	Low----------	0.37			
	17-48	35-45	1.40-1.60	<0.06	0.09-0.15	4.5-6.0	High---------	0.37			
	48-60	25-37	1.50-1.70	<0.06	0.08-0.14	5.1-6.5	Moderate-----	0.37			
	60-70	22-30	1.60-1.80	<0.06	0.14-0.22	5.6-7.3	Moderate-----	0.37			
Huey------------	0-9	15-27	1.35-1.50	0.2-0.6	0.22-0.24	5.1-7.8	Low----------	0.43	3	6	1-3
	9-12	20-35	1.40-1.60	0.06-0.2	0.10-0.18	5.6-8.4	Moderate-----	0.43			
	12-46	25-35	1.45-1.65	<0.06	0.05-0.08	7.4-9.0	Moderate-----	0.43			
	46-60	18-35	1.55-1.75	0.06-0.2	0.10-0.15	6.6-8.4	Moderate-----	0.43			
3071----------- Darwin	0-11	40-45	1.20-1.40	<0.06	0.11-0.14	6.1-7.8	Very high----	0.28	5	4	3-4
	11-44	45-60	1.30-1.50	<0.06	0.11-0.14	6.1-7.8	Very high----	0.28			
	44-60	30-55	1.40-1.60	0.06-0.2	0.10-0.20	6.6-8.4	High---------	0.28			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
3288-------------	0-6	27-35	1.20-1.40	0.2-0.6	0.21-0.23	5.6-8.4	Moderate-----	0.32	5	7	2-3
Petrolia	6-60	27-35	1.35-1.45	0.2-0.6	0.18-0.20	6.1-7.3	Moderate-----	0.32			
3304-------------	0-12	7-20	1.40-1.60	2.0-6.0	0.13-0.20	6.1-8.4	Low----------	0.20	4	3	1-2
Landes	12-41	5-18	1.60-1.70	2.0-6.0	0.10-0.15	6.1-8.4	Low----------	0.32			
	41-60	5-18	1.60-1.80	6.0-20	0.05-0.15	6.1-8.4	Low----------	0.20			
3331-------------	0-9	10-18	1.30-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	5	5	1-3
Haymond	9-42	10-18	1.30-1.45	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.37			
	42-60	10-18	1.30-1.45	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.37			
3333-------------	0-9	10-17	1.30-1.50	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	5	5	1-3
Wakeland	9-60	10-17	1.30-1.50	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.37			
7071-------------	0-13	40-45	1.20-1.40	<0.06	0.11-0.14	6.1-7.8	Very high----	0.28	5	4	3-4
Darwin	13-48	45-60	1.30-1.50	<0.06	0.11-0.14	6.1-7.8	Very high----	0.28			
	48-60	30-55	1.40-1.60	0.06-0.2	0.10-0.20	6.6-8.4	High---------	0.28			
7288-------------	0-8	27-35	1.20-1.40	0.2-0.6	0.21-0.23	5.6-8.4	Moderate-----	0.32	5	7	2-3
Petrolia	8-60	27-35	1.35-1.45	0.2-0.6	0.18-0.20	6.1-7.3	Moderate-----	0.32			
7304-------------	0-12	7-20	1.40-1.60	2.0-6.0	0.13-0.20	6.1-8.4	Low----------	0.20	4	3	1-2
Landes	12-41	5-18	1.60-1.70	2.0-6.0	0.10-0.15	6.1-8.4	Low----------	0.32			
	41-60	5-18	1.60-1.80	6.0-20	0.05-0.15	6.1-8.4	Low----------	0.20			
7331-------------	0-9	10-18	1.30-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	5	5	1-3
Haymond	9-42	10-18	1.30-1.45	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.37			
	42-60	10-18	1.30-1.45	0.6-2.0	0.20-0.22	6.1-7.3	Low----------	0.37			
7333-------------	0-9	10-17	1.30-1.50	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	5	5	1-3
Wakeland	9-60	10-17	1.30-1.50	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.37			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft					
2-----------------Cisne	D	None---------	---	---	0-2.0	Perched	Feb-Jun	High-----	High-----	Moderate.
3B, 3B2-----------Hoyleton	C	None---------	---	---	1.0-3.0	Apparent	Mar-Jun	High-----	High-----	High.
4B, 4C2-----------Richview	C	None---------	---	---	4.0-6.0	Apparent	Feb-May	High-----	Moderate	High.
7C2, 7C3, 7D2, 7D3--------------Atlas	D	None---------	---	---	1.0-2.0	Perched	Apr-Jun	High-----	High-----	Moderate.
8F, 8F2, 8G-------Hickory	C	None---------	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
12----------------Wynoose	D	None---------	---	---	0-2.0	Perched	Mar-Jun	High-----	High-----	High.
13A, 13B2---------Bluford	C	None---------	---	---	1.0-3.0	Perched	Mar-Jun	High-----	High-----	High.
14B, 14C2---------Ava	C	None---------	---	---	1.5-3.5	Perched	Mar-Jun	High-----	Moderate	High.
48----------------Ebbert	C/D	None---------	---	---	+.5-2.0	Apparent	Apr-Jul	High-----	High-----	Moderate.
109---------------Racoon	C/D	Occasional	Brief-----	Mar-May	+.5-1.0	Apparent	Mar-Jun	High-----	High-----	High.
120---------------Huey	D	None---------	---	---	+.5-2.0	Perched	Mar-Jun	High-----	High-----	Low.
131B, 131C2, 131E2------------Alvin	B	None---------	---	---	>6.0	---	---	Moderate	Low------	High.
138---------------Shiloh	B/D	None---------	---	---	+1-2.0	Apparent	Mar-Jun	High-----	High-----	Low.
178---------------Ruark	B/D	None---------	---	---	+.5-2.0	Apparent	Mar-Jul	High-----	High-----	High.
184---------------Roby	C	None---------	---	---	1.0-3.0	Apparent	Mar-Jun	High-----	Moderate	High.
212B, 212C2-------Thebes	B	None---------	---	---	>6.0	---	---	High-----	Moderate	High.
218---------------Newberry	C	None---------	---	---	0-2.0	Apparent	Mar-Jun	High-----	High-----	High.
424---------------Shoals	C	Frequent----	Brief-----	Oct-Jun	0.5-1.5	Apparent	Jan-Apr	High-----	High-----	Low.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft					
533*. Urban land										
581B2. Tamalco	D	None	---	---	2.5-5.0	Apparent	Feb-Apr	High	High	Low.
620A, 620B2. Darmstadt	D	None	---	---	1.0-3.0	Perched	Feb-May	High	High	High.
779D. Chelsea	A	None	---	---	>6.0	---	---	Low	Low	Low.
805C*. Orthents										
866*. Dumps										
967F*, 967G*:										
Hickory	C	None	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
Gosport	C	None	---	---	>6.0	---	---	Moderate	High	High.
991*:										
Cisne	D	None	---	---	0-2.0	Perched	Feb-Jun	High	High	Moderate.
Huey	D	None	---	---	+.5-2.0	Perched	Mar-Jun	High	High	Low.
3071. Darwin	D	Frequent	Long	Jan-Jun	+1-2.0	Apparent	Jan-Jun	Moderate	High	Low.
3288. Petrolia	C/D	Frequent	Long	Mar-Jun	+.5-3.0	Apparent	Apr-Jun	High	High	Low.
3304. Landes	B	Frequent	Brief	Jan-Jun	>6.0	---	---	Moderate	Low	Low.
3331. Haymond	B	Frequent	Brief	Jan-May	>6.0	---	---	High	Low	Low.
3333. Wakeland	C	Frequent	Brief	Jan-May	1.0-3.0	Apparent	Jan-Apr	High	High	Low.
7071. Darwin	D	Rare	---	---	+1-2.0	Apparent	Jan-Jun	Moderate	High	Low.
7288. Petrolia	C/D	Rare	---	---	+.5-3.0	Apparent	Apr-Jun	High	High	Low.
7304. Landes	B	Rare	---	---	>6.0	---	---	Moderate	Low	Low.
7331. Haymond	B	Rare	---	---	>6.0	---	---	High	Low	Low.
7333. Wakeland	C	Rare	---	---	1.0-3.0	Apparent	Jan-Apr	High	High	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--ENGINEERING INDEX TEST DATA

(Dashes indicate that data were not available. MAX means maximum dry density; OPT, optimum moisture; LL, liquid limit; PI, plasticity index; UN, Unified; and NP, nonplastic)

Soil name and location	Sample number	Horizon	Depth	Moisture density MAX	Moisture density OPT	Percentage passing sieve-- No. 4	No. 10	No. 40	No. 200	LL	PI	Classification AASHTO	Classification UN
			In	Lb/ cu ft	Pct					Pct			
Chelsea loamy fine sand: 2,498 feet south and 1,865 feet west of the northeast corner of sec. 21, T. 5 N., R. 14 W.	S84IL-079-75-1	Ap	0-6	113	11	100	100	94	13	---	NP	A-2-4	SM
	-75-2	E	6-25	111	12	100	100	94	10	---	NP	A-3	SW-SM
	-75-4	E&Bt2	41-60	103	16	100	100	97	3	---	NP	A-3	SP
Darmstadt silt loam: 855 feet west and 738 feet south of the northeast corner of sec. 6, T. 8 N., R. 9 E.	S84IL-079-29-1	Ap	0-9	107	16	100	99	93	85	30	4	A-4	CL
	-29-3	Bt	15-26	97	20	100	99	97	94	59	30	A-7-6	CH
	-29-5	Btg2	31-44	110	17	100	99	96	90	43	21	A-7-6	CL
Hoyleton silt loam: 905 feet south and 912 feet west of the northeast corner of sec. 34, T. 6 N., R. 9 E.	S82IL-079-21-1	Ap	0-8	101	19	100	100	94	86	34	6	A-4	CL
	-21-2	E	8-15	105	18	100	100	95	88	32	6	A-4	CL
	-21-4	Bt2	24-34	94	23	100	99	97	93	51	18	A-7	CH
Huey silt loam: 495 feet south and 1,565 feet west of the center of sec. 12, T. 8 N., R. 8 E.	S83IL-079-15-1	Ap	0-9	107	16	100	99	95	83	25	2	A-4	CL
	-15-4	Btg2	21-36	105	19	100	99	97	92	50	25	A-6	CL
	-15-6	2Btg4	45-53	113	15	100	99	95	69	39	17	A-6	CL
Petrolia silty clay loam: 290 feet east and 1,150 feet north of the southwest corner of sec. 31, T. 6 N., R. 14 W.	S84IL-079-27-1	Ap	0-8	104	18	100	100	97	92	36	10	A-4	CL
	-27-4	Cg3	23-35	107	20	100	99	95	85	39	15	A-6	CL
Racoon silt loam: 43 feet south and 1,435 feet east of the northwest corner of sec. 5, T. 7 N., R. 8 E.	S82IL-079-21-1	Ap	0-6	106	14	100	99	98	93	31	7	A-4	CL
	-21-2	E1	6-19	109	17	100	100	98	93	31	8	A-4	CL
	-21-5	Btg2	32-43	118	17	100	100	99	96	36	17	A-6	CL
Shiloh silty clay loam: 485 feet south and 2,258 feet east of the northwest corner of sec. 23, T. 8 N., R. 8 E.	S83IL-079-6-1	Ap	0-8	99	22	100	100	99	93	44	16	A-7	CL
	-6-3	Bg1	16-29	100	21	100	100	99	95	53	28	A-7	CH
	-6-5	Bg3	35-46	102	19	100	100	99	96	56	28	A-7	CH

TABLE 19.--CLASSIFICATION OF THE SOILS

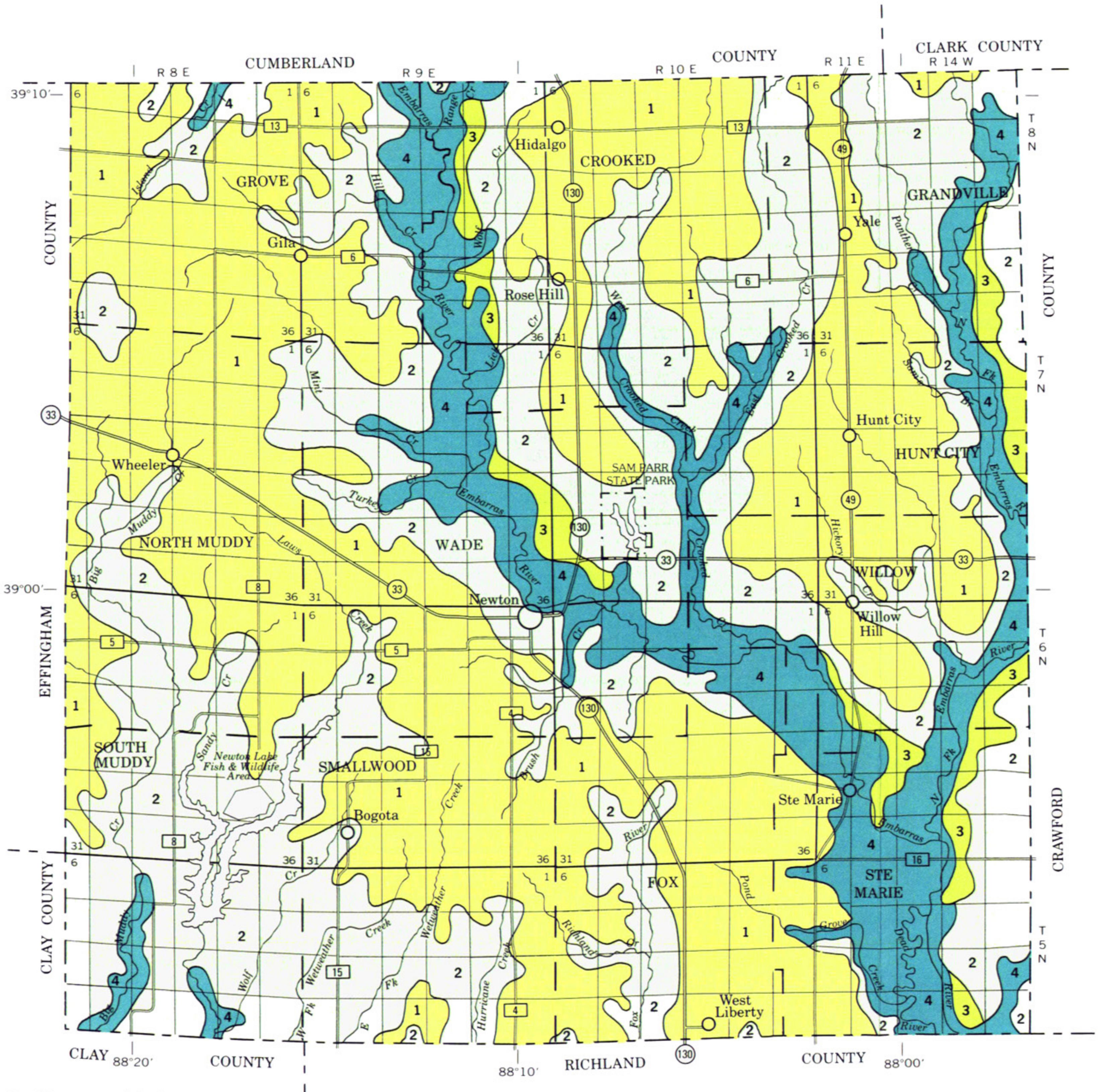
(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Alvin	Coarse-loamy, mixed, mesic Typic Hapludalfs
Atlas	Fine, montmorillonitic, mesic, sloping Aeric Ochraqualfs
Ava	Fine-silty, mixed, mesic Typic Fragiudalfs
Bluford	Fine, montmorillonitic, mesic Aeric Ochraqualfs
Chelsea	Mixed, mesic Alfic Udipsamments
Cisne	Fine, montmorillonitic, mesic Mollic Albaqualfs
Darmstadt	Fine-silty, mixed, mesic Albic Natraqualfs
Darwin	Fine, montmorillonitic, mesic Vertic Haplaquolls
Ebbert	Fine-silty, mixed, mesic Argiaquic Argialbolls
Gosport	Fine, illitic, mesic Typic Dystrochrepts
Haymond	Coarse-silty, mixed, nonacid, mesic Typic Udifluvents
Hickory	Fine-loamy, mixed, mesic Typic Hapludalfs
Hoyleton	Fine, montmorillonitic, mesic Aquollic Hapludalfs
Huey	Fine-silty, mixed, mesic Typic Natraqualfs
Landes	Coarse-loamy, mixed, mesic Fluventic Hapludolls
Newberry	Fine-silty, mixed, mesic Mollic Ochraqualfs
Orthents	Fine, mixed, mesic Udorthents
Petrolia	Fine-silty, mixed, nonacid, mesic Typic Fluvaquents
Racoon	Fine-silty, mixed, mesic Typic Ochraqualfs
Richview	Fine-silty, mixed, mesic Mollic Hapludalfs
Roby	Coarse-loamy, mixed, mesic Aquic Hapludalfs
Ruark	Fine-loamy, mixed, mesic Typic Ochraqualfs
Shiloh	Fine, montmorillonitic, mesic Cumulic Haplaquolls
Shoals	Fine-loamy, mixed, nonacid, mesic Aeric Fluvaquents
Tamalco	Fine, montmorillonitic, mesic Typic Natrudalfs
*Thebes	Fine-silty over sandy or sandy-skeletal, mixed, mesic Typic Hapludalfs
Wakeland	Coarse-silty, mixed, nonacid, mesic Aeric Fluvaquents
Wynoose	Fine, montmorillonitic, mesic Typic Albaqualfs

NRCS Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.



SOIL LEGEND*

1 — CISNE-HOYLETON-DARMSTADT ASSOCIATION: Nearly level to gently sloping, poorly drained and some what poorly drained, silty soils formed in loess and the underlying sediments; on uplands

2 — BLUFORD-WYNOOSE-ATLAS ASSOCIATION: Nearly level to strongly sloping, somewhat poorly drained and poorly drained, silty soils formed in loess and the underlying sediments or in glacial till; on uplands

3 — THEBES-ALVIN ASSOCIATION: Gently sloping to steep, well drained, silty and loamy soils formed in loess and the underlying sandy material or in loamy and sandy material; on terraces and uplands

4 — WAKELAND-PETROLIA ASSOCIATION: Nearly level, somewhat poorly drained and poorly drained, silty soils formed in alluvium; on flood plains

*Unless otherwise indicated, the texture terms in the descriptive headings refer to the surface layer of the major soils in the associations.

Compiled 1991

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ILLINOIS AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

JASPER COUNTY, ILLINOIS

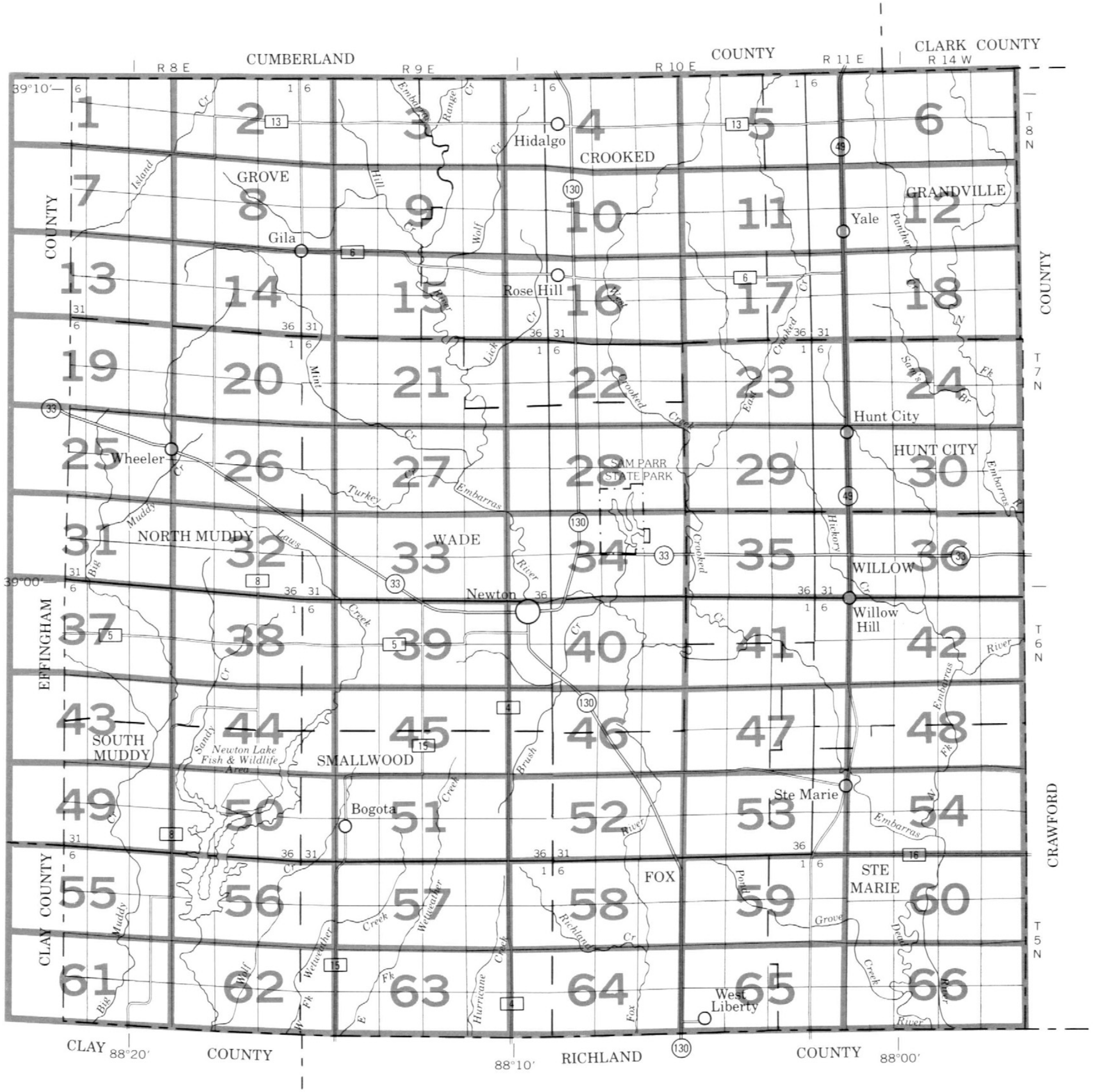
Scale 1:190,080

1 0 1 2 3 Mi

1 0 3 6 Km

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

Original text from each individual map sheet read: This soil survey map is compiled on 1981 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

INDEX TO MAP SHEETS

JASPER COUNTY, ILLINOIS

Scale 1:190,080

1 0 1 2 3 Mi

1 0 3 6 Km

SOIL LEGEND

Map symbols consist of numbers or a combination of numbers and a letter. The initial numbers represent the kinds of soil. A capital letter following these numbers indicates the class of slope. Symbols without a slope letter are for nearly level soils or miscellaneous areas. A final number of 2 following the slope letter indicates that the soil is eroded and 3 that it is severely eroded.

SYMBOL	NAME
2	Cisne silt loam
3B	Hoyleton silt loam, 1 to 3 percent slopes
3B2	Hoyleton silt loam, 2 to 5 percent slopes, eroded
4B	Richview silt loam, 2 to 5 percent slopes
4C2	Richview silt loam, 5 to 10 percent slopes, eroded
7C2	Atlas silt loam, 5 to 10 percent slopes, eroded
7C3	Atlas silty clay loam, 5 to 10 percent slopes, severely eroded
7D2	Atlas silt loam, 10 to 15 percent slopes, eroded
7D3	Atlas silty clay loam, 10 to 15 percent slopes, severely eroded
8F	Hickory loam, 15 to 30 percent slopes
8F2	Hickory loam, 15 to 30 percent slopes, eroded
8G	Hickory loam, 30 to 60 percent slopes
12	Wynoose silt loam
13A	Bluford silt loam, 0 to 2 percent slopes
13B2	Bluford silt loam, 2 to 5 percent slopes, eroded
14B	Ava silt loam, 1 to 5 percent slopes
14C2	Ava silt loam, 5 to 10 percent slopes, eroded
48	Ebbert silt loam
109	Racoon silt loam
120	Huey silt loam
131B	Alvin fine sandy loam, 1 to 5 percent slopes
131C2	Alvin fine sandy loam, 5 to 12 percent slopes, eroded
131E2	Alvin fine sandy loam, 12 to 25 percent slopes, eroded
138	Shiloh silty clay loam
178	Ruark fine sandy loam
184	Roby fine sandy loam
212B	Thebes silt loam, 1 to 5 percent slopes
212C2	Thebes silt loam, 5 to 10 percent slopes, eroded
218	Newberry silt loam
424	Shoals silt loam
533	Urban land
581B2	Tamalco silt loam, 1 to 5 percent slopes, eroded
620A	Darmstadt silt loam, 0 to 2 percent slopes
620B2	Darmstadt silt loam, 2 to 5 percent slopes, eroded
779D	Chelsea loamy fine sand, 7 to 18 percent slopes
805C	Orthents, clayey, sloping
866	Dumps, slurry
967F	Hickory-Gosport complex, 18 to 30 percent slopes
967G	Hickory-Gosport complex, 30 to 60 percent slopes
991	Cisne-Huey silt loams
3071	Darwin silty clay, frequently flooded
3288	Petrolia silty clay loam, frequently flooded
3304	Landes fine sandy loam, frequently flooded
3331	Haymond silt loam, frequently flooded
3333	Wakeland silt loam, frequently flooded
7071	Darwin silty clay, rarely flooded
7288	Petrolia silty clay loam, rarely flooded
7304	Landes fine sandy loam, rarely flooded
7331	Haymond silt loam, rarely flooded
7333	Wakeland silt loam, rarely flooded

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- County or parish
- Reservation (state forest or park)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, — Davis Airstrip

STATE COORDINATE TICK — 890 000 FEET

LAND DIVISION CORNERS (sections)

ROADS

- Other roads

ROAD EMBLEMS & DESIGNATIONS

- State — 49

RAILROAD

LEVEES

- Without road

DAMS

- Large (to scale)
- Medium or small — water, w

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Drainage ditch

LAKES, PONDS AND RESERVOIRS

- Perennial — water, w
- Intermittent — int, i

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — 13A 14B

ESCARPMENTS

- Other than bedrock (points down slope)

SHORT STEEP SLOPE

DEPRESSION OR SINK

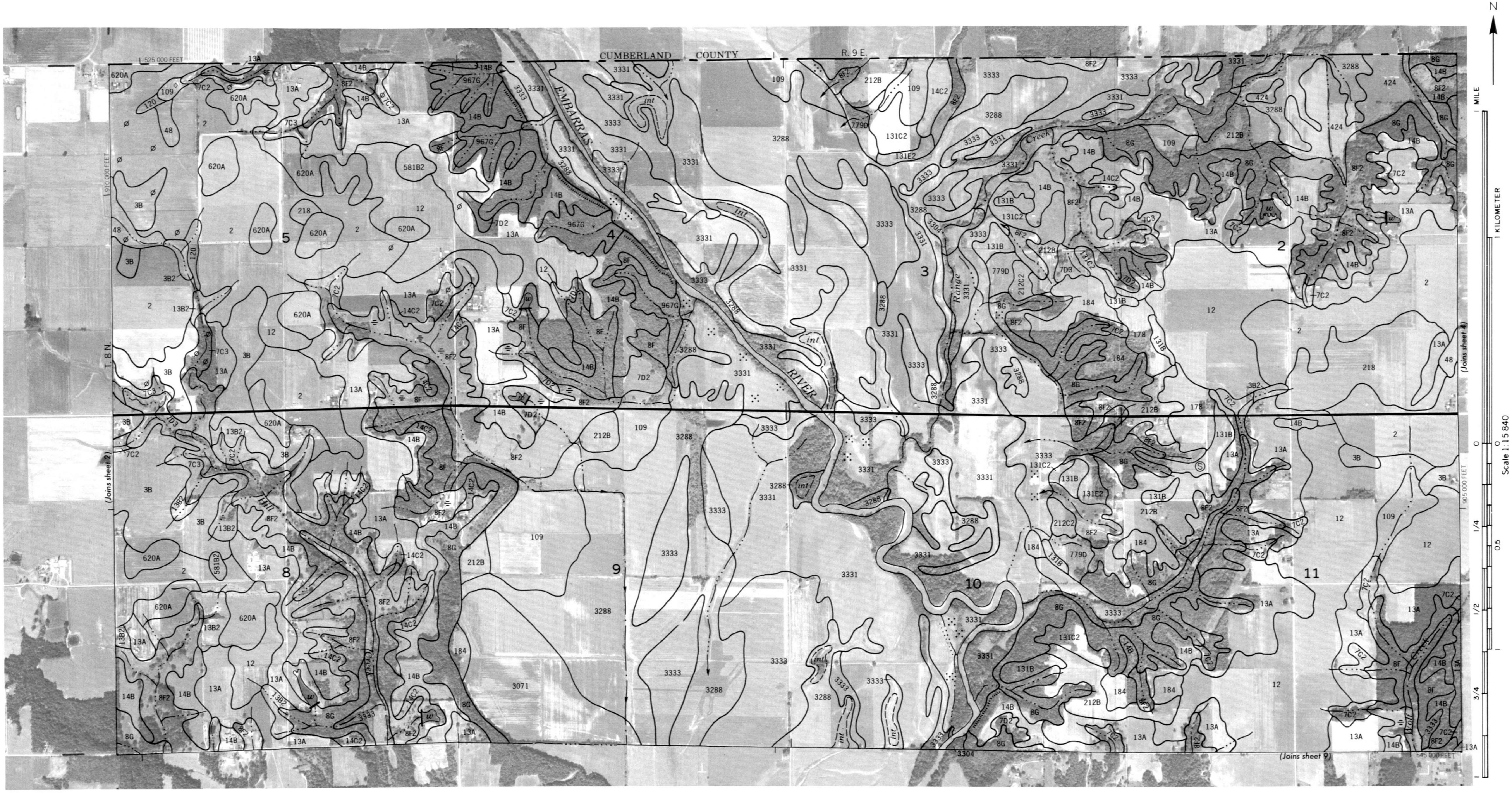
SOIL SAMPLE SITE — S

MISCELLANEOUS

- Slick or scabby spot (sodic)
- Rock outcrop (includes sandstone and shale)
- Sandy spot
- Severely eroded spot
- Oil waste land
- Sand pit

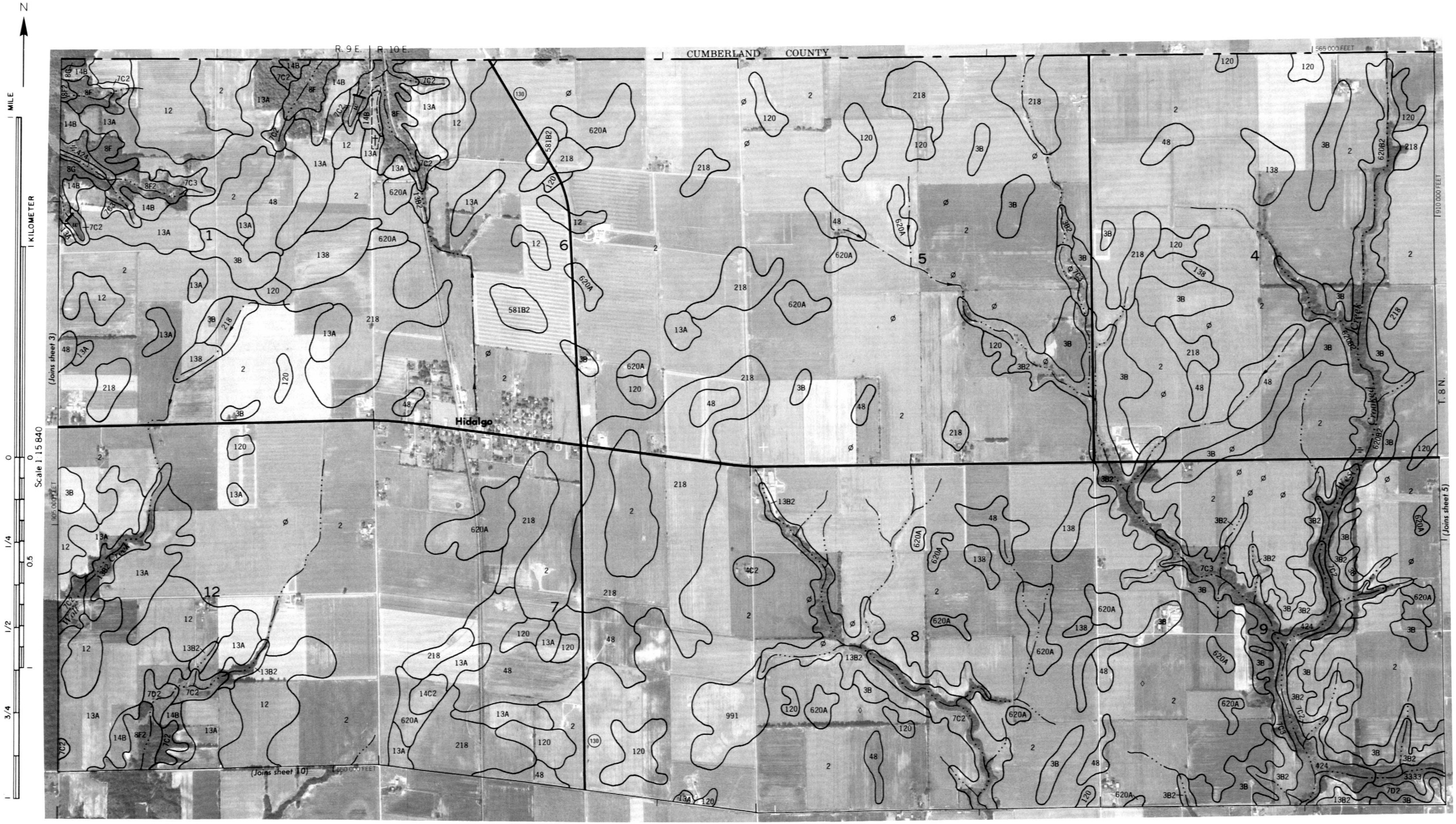

1
N
CUMBERLAND COUNTY
EFFINGHAM COUNTY
R. 8 E.
T. 8 N.
490 000 FEET
500 000 FEET
Webster Branch Creek
(Joins sheet 2)
(Joins sheet 7)
MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
1

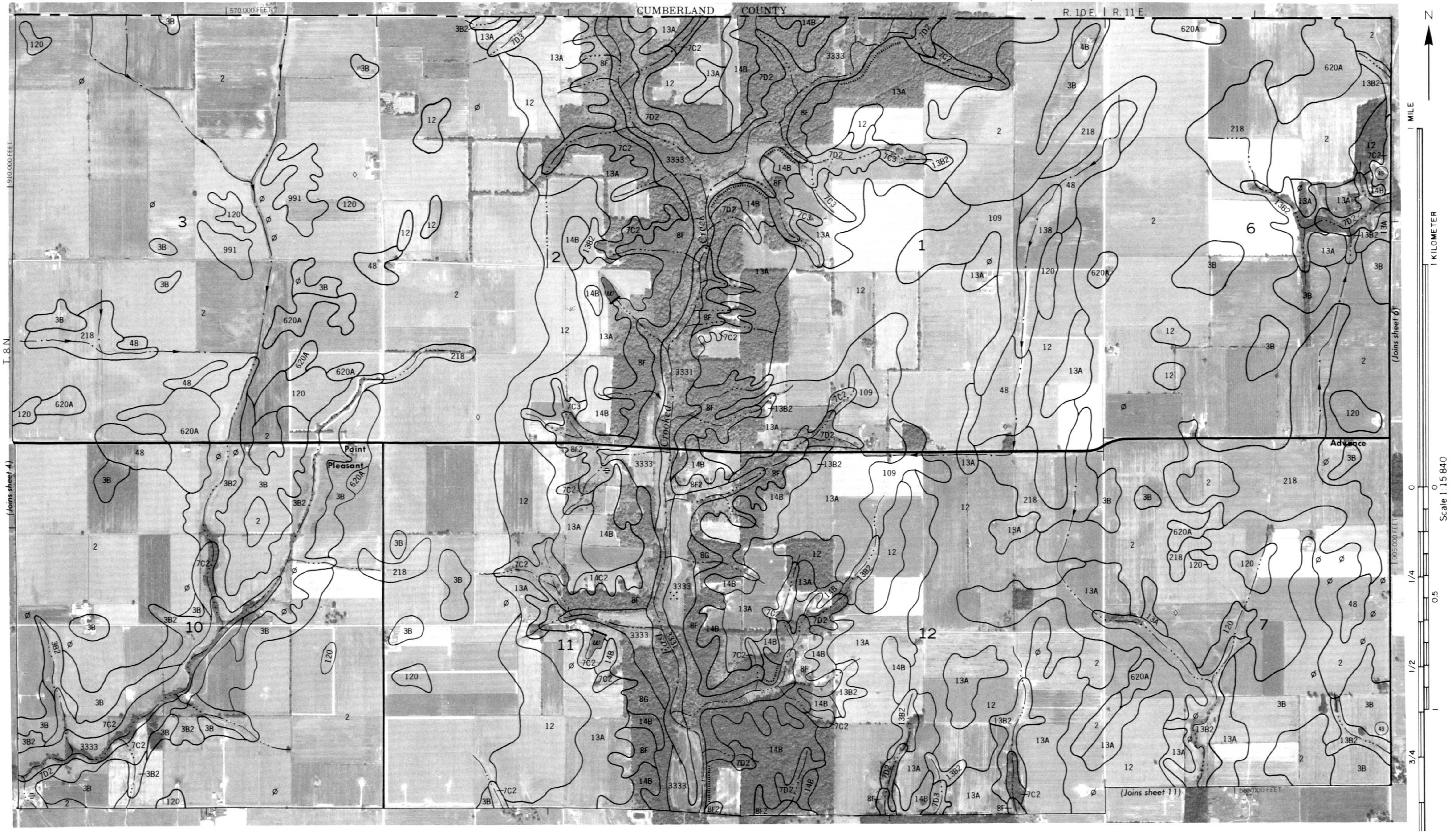

N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
CUMBERLAND
COUNTY
R. 8 E.
R. 9 E.
T. 8 N.
520 000 FEET
910 000 FEET
505 000 FEET
(Joins sheet 1)
(Joins sheet 3)
(Joins sheet 8)
Island
Creek
1
2
3
6
7
10
11
12

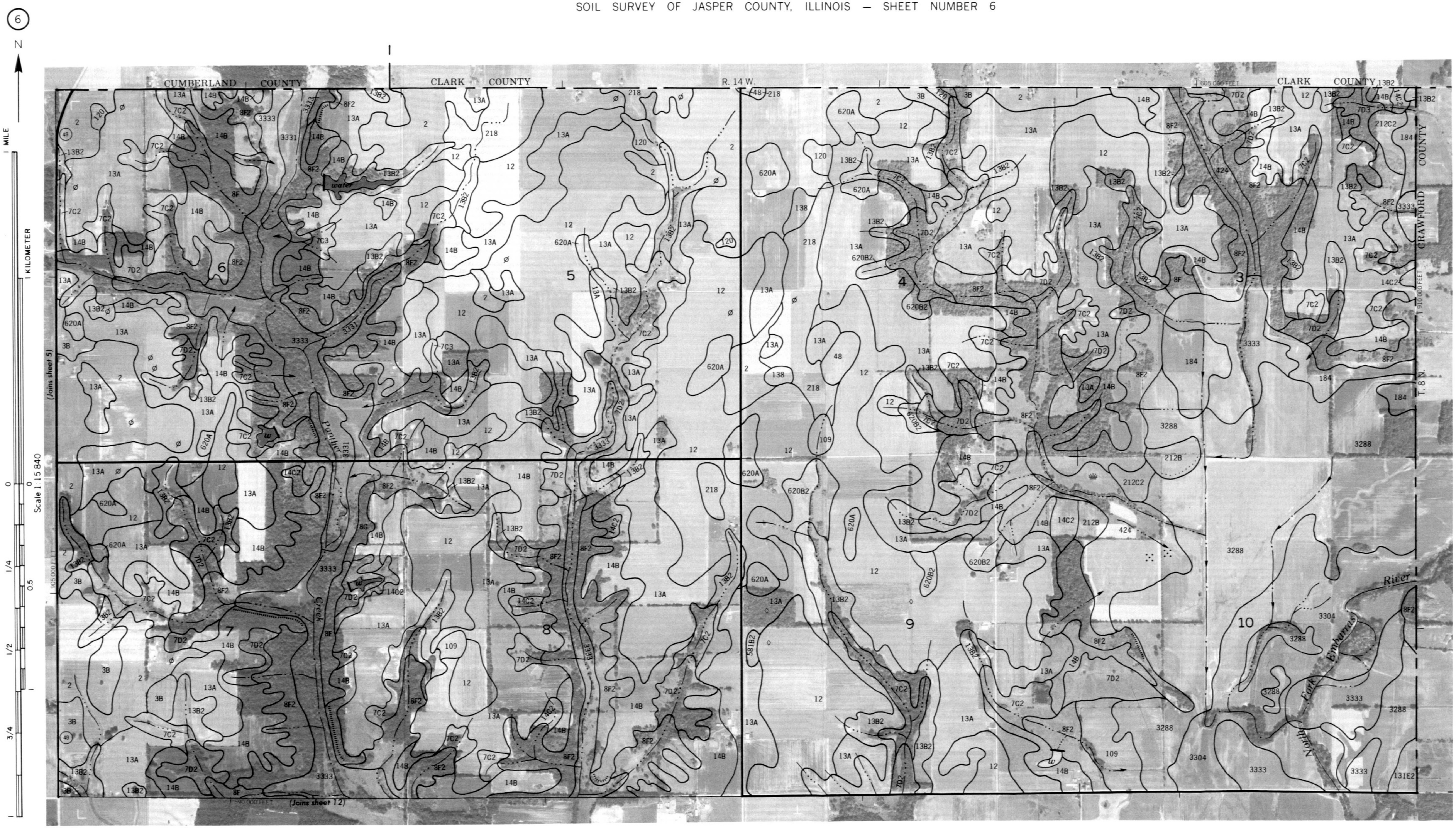


N
CUMBERLAND COUNTY
R. 9 E.
T. 8 N.
EMBARRAS
RIVER
Range
Creek
Hill
(Joins sheet 2)
(Joins sheet 4)
(Joins sheet 9)
525 000 FEET
910 000 FEET
905 000 FEET
545 000 FEET
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5

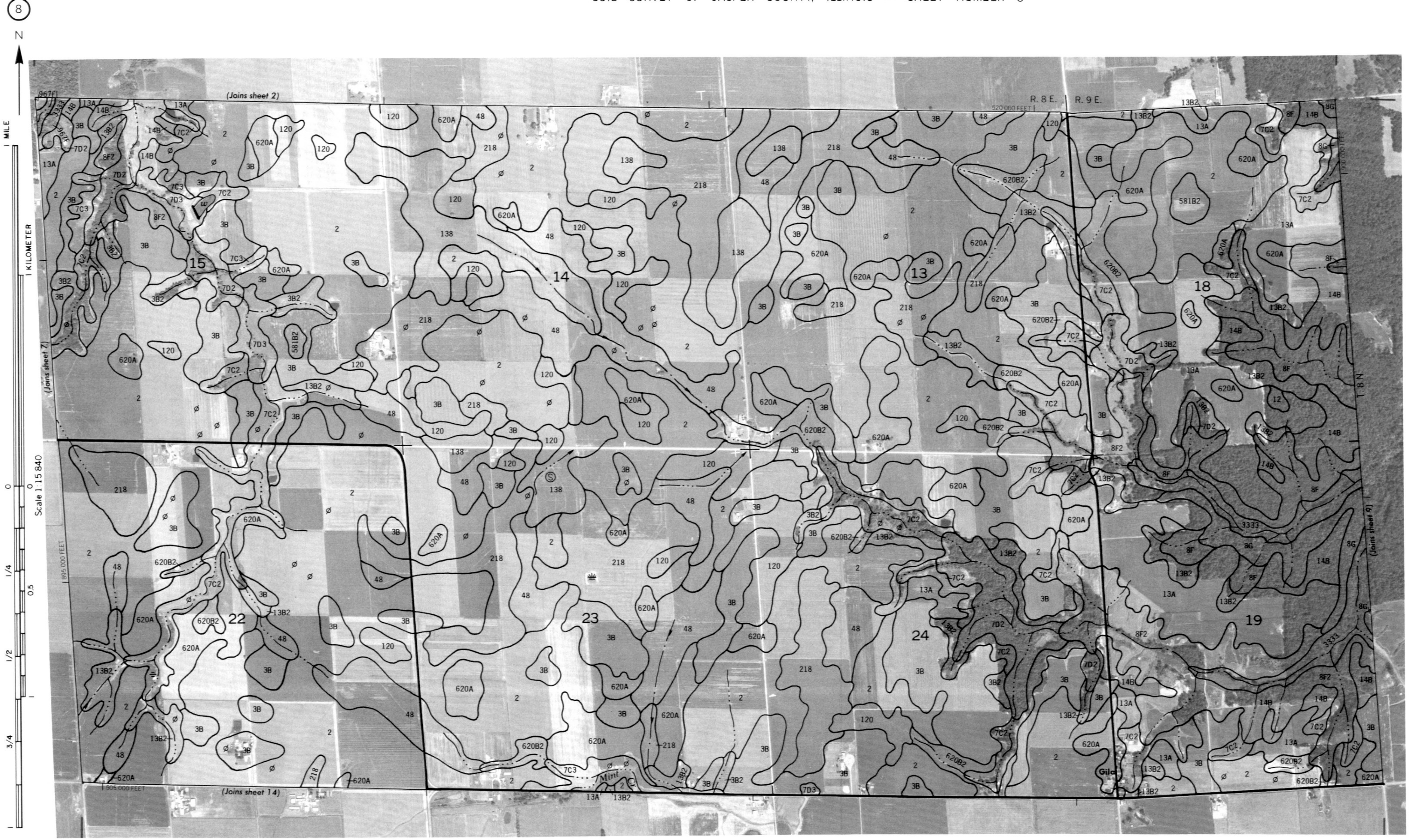
SOIL SURVEY OF JASPER COUNTY, ILLINOIS — SHEET NUMBER 4



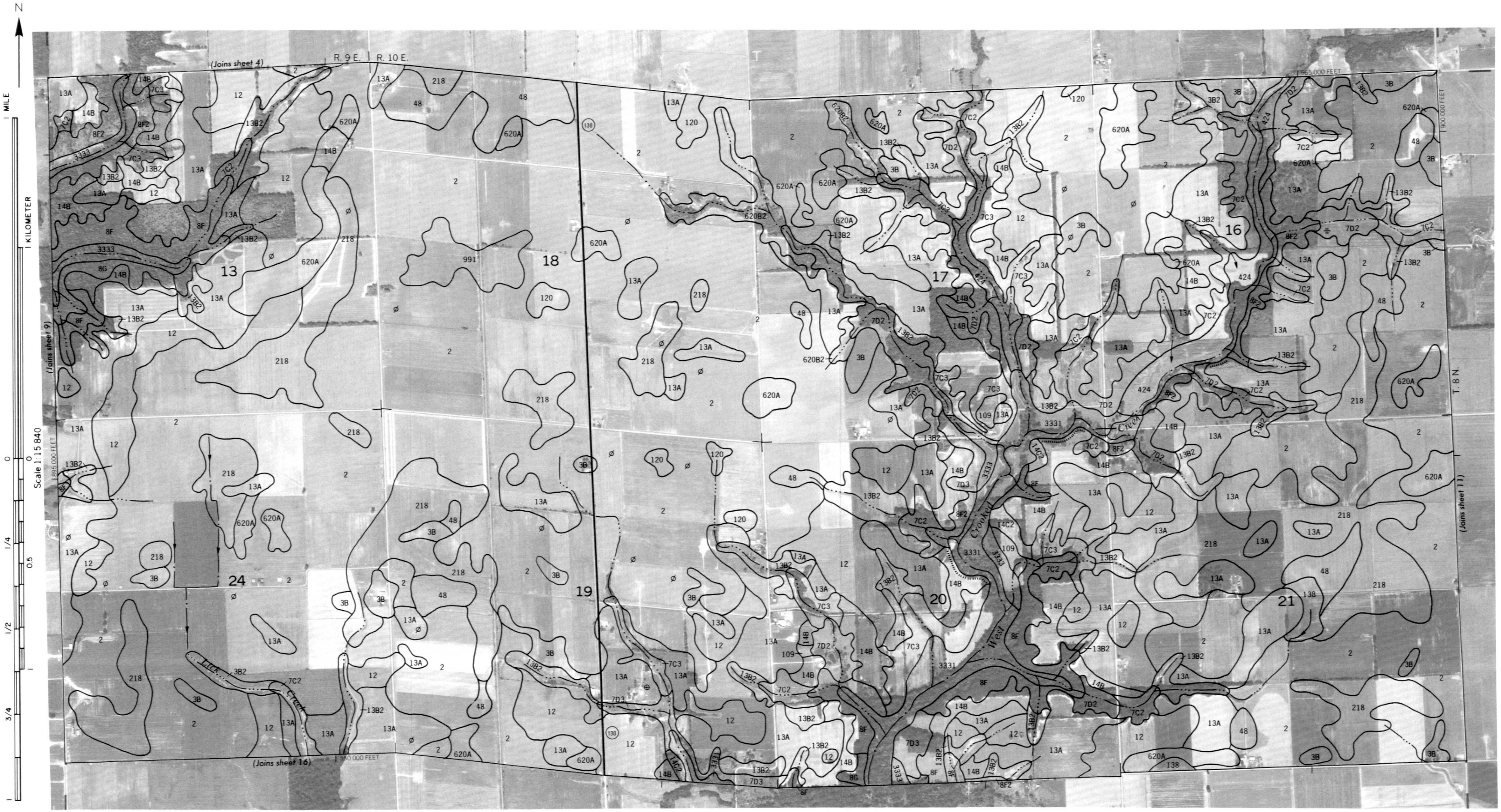

CUMBERLAND COUNTY
R. 10 E. | R. 11 E.
T. 8 N.
570 000 FEET
910 000 FEET
905 000 FEET
585 000 FEET
Crooked Creek
Point Pleasant
Advance
(Joins sheet 4)
(Joins sheet 6)
(Joins sheet 11)
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
1
2
3
6
7
10
11
12

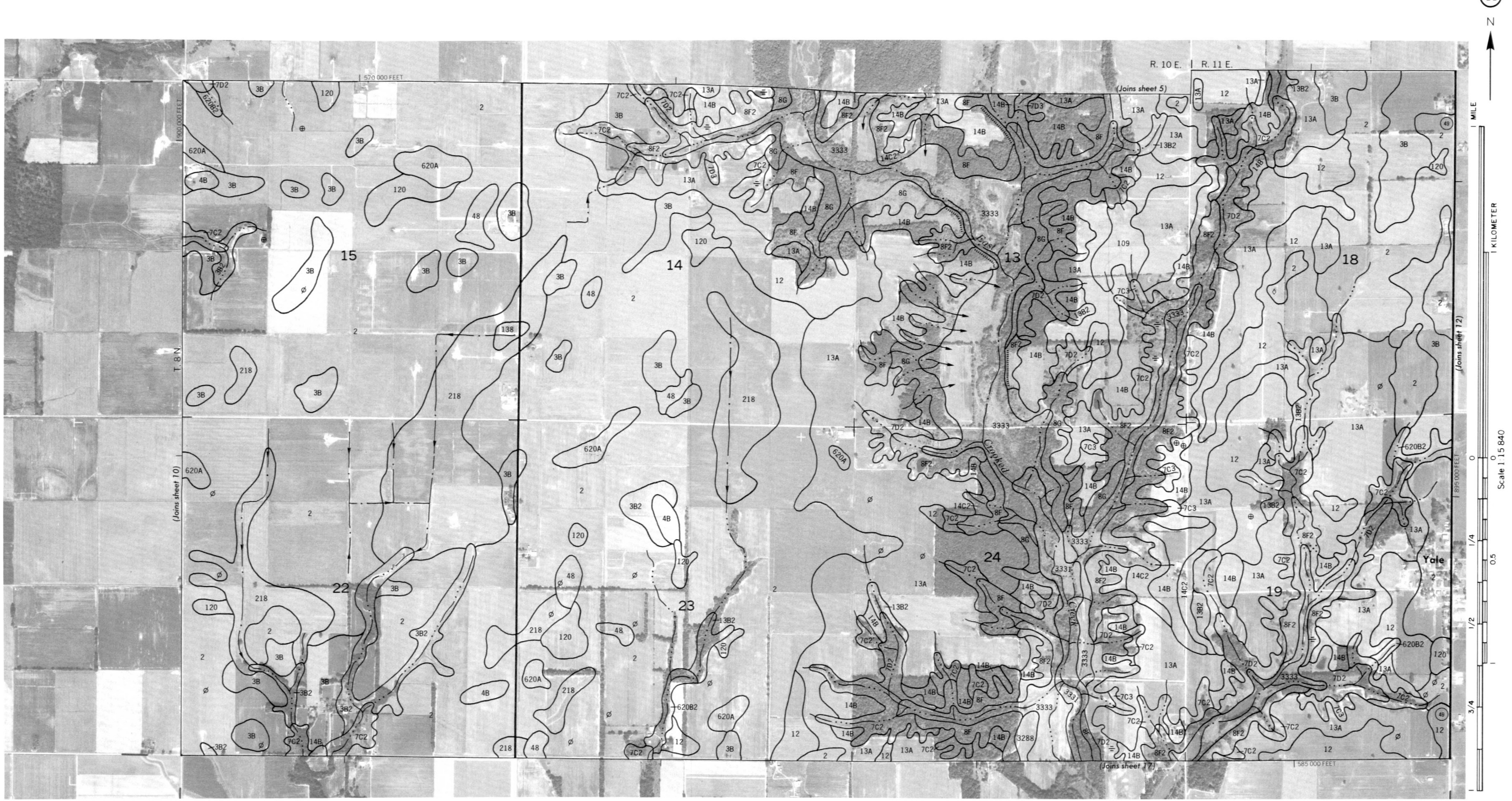

6
N
1 MILE
1 KILOMETER
Scale 1:15 840
CUMBERLAND COUNTY
CLARK COUNTY
R. 14 W.
CLARK COUNTY
CRAWFORD COUNTY
T. 8 N.
(Joins sheet 5)
(Joins sheet 12)
Panther Creek
North Fork Embarras River


N
(Joins sheet 1)
R. 8 E.
490 000 FEET
900 000 FEET
T. 8 N.
EFFINGHAM COUNTY
16
17
18
19
20
21
Island Creek
Island Creek
(Joins sheet 8)
895 000 FEET
500 000 FEET
(Joins sheet 13)
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
0
0.5
Scale 1:15 840


8
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1
0
0.5
(Joins sheet 2)
(Joins sheet 7)
(Joins sheet 9)
(Joins sheet 14)
R. 8 E.
R. 9 E.
T. 8 N.
520 000 FEET
895 000 FEET
505 000 FEET
15
14
13
18
22
23
24
19
Gila
Mint Cr.


R. 9 E.
T. 8 N.
(Joins sheet 3)
(Joins sheet 10)
(Joins sheet 15)
(Joins sheet 8)
EMBARRAS
RIVER
Hill
Creek
Wall
Creek
17
16
15
14
20
21
22
23
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1

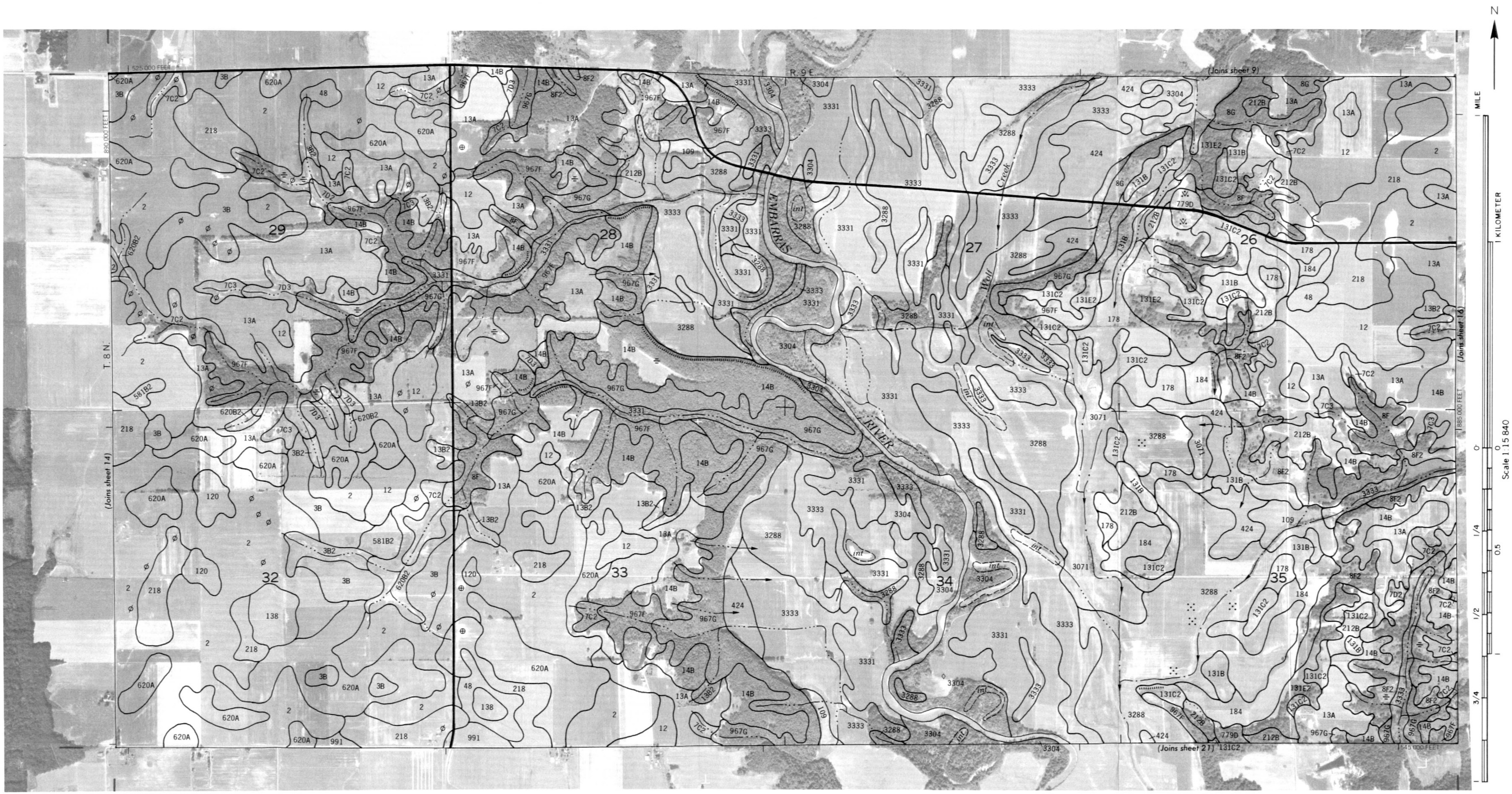

N
1 MILE
1 KILOMETER
Scale 1:15 840
(Joins sheet 4)
R. 9 E.
R. 10 E.
565 000 FEET
900 000 FEET
895 000 FEET
550 000 FEET
T. 8 N.
(Joins sheet 9)
(Joins sheet 11)
(Joins sheet 16)
13
16
17
18
19
20
21
24
West
Crooked
Creek


11
N
R. 10 E.
R. 11 E.
(Joins sheet 5)
(Joins sheet 10)
(Joins sheet 12)
(Joins sheet 17)
T. 8 N.
570 000 FEET
585 000 FEET
900 000 FEET
895 000 FEET
East
Crooked
Yale
1 MILE
1 KILOMETER
Scale 1:15 840


12
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
0.5
1/2
1
3/4
(Joins sheet 6)
(Joins sheet 11)
(Joins sheet 18)
R. 14 W.
T. 8 N.
CRAWFORD COUNTY
605 000 FEET
590 000 FEET
Yale
Panther Creek
North Fork Embarras River
18
17
16
15
19
20
21
22

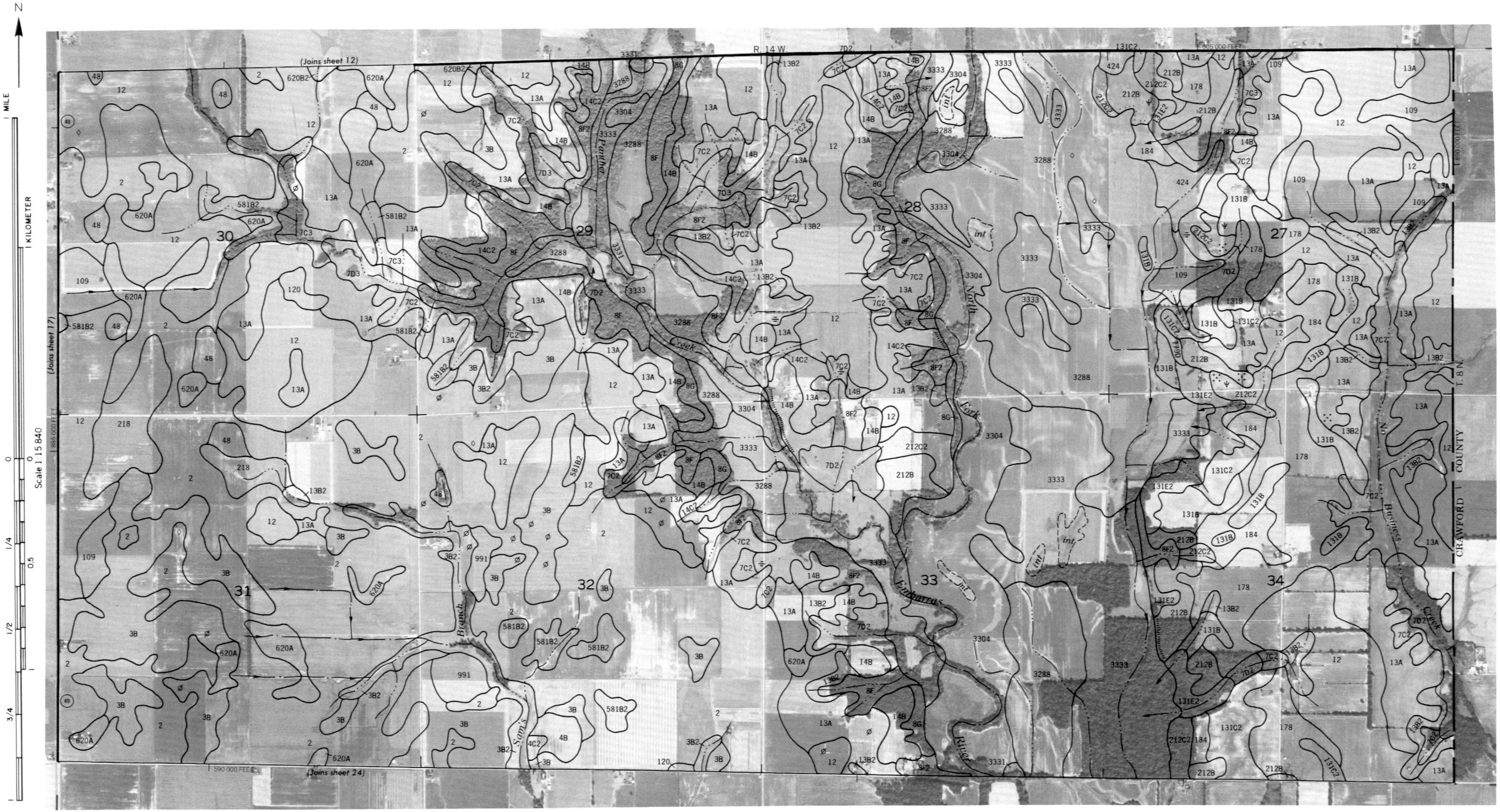

N
R. 8 E.
(Joins sheet 7)
(Joins sheet 14)
(Joins sheet 19)
490 000 FEET
890 000 FEET
885 000 FEET
500 000 FEET
T. 8 N.
EFFINGHAM COUNTY
Island Creek
Island Grove
Big Muddy Creek
29
28
30
31
32
33
1 MILE
1 KILOMETER
Scale 1:15 840


14
N
1 MILE
1 KILOMETER
Scale 1:15 840
(Joins sheet 8)
(Joins sheet 13)
(Joins sheet 15)
(Joins sheet 20)
(21)
R. 8 E. | R. 9 E.
T. 8 N.
520 000 FEET
505 000 FEET
885 000 FEET
Mint Creek
27
26
25
30
34
35
36
31


N
(Joins sheet 9)
(Joins sheet 14)
(Joins sheet 16)
(Joins sheet 21)
R. 9 E.
T. 8 N.
525 000 FEET
890 000 FEET
885 000 FEET
545 000 FEET
EMBARRAS
RIVER
Wolf
Creek
26
27
28
29
32
33
34
35
1 MILE
1 KILOMETER
Scale 1:15 840

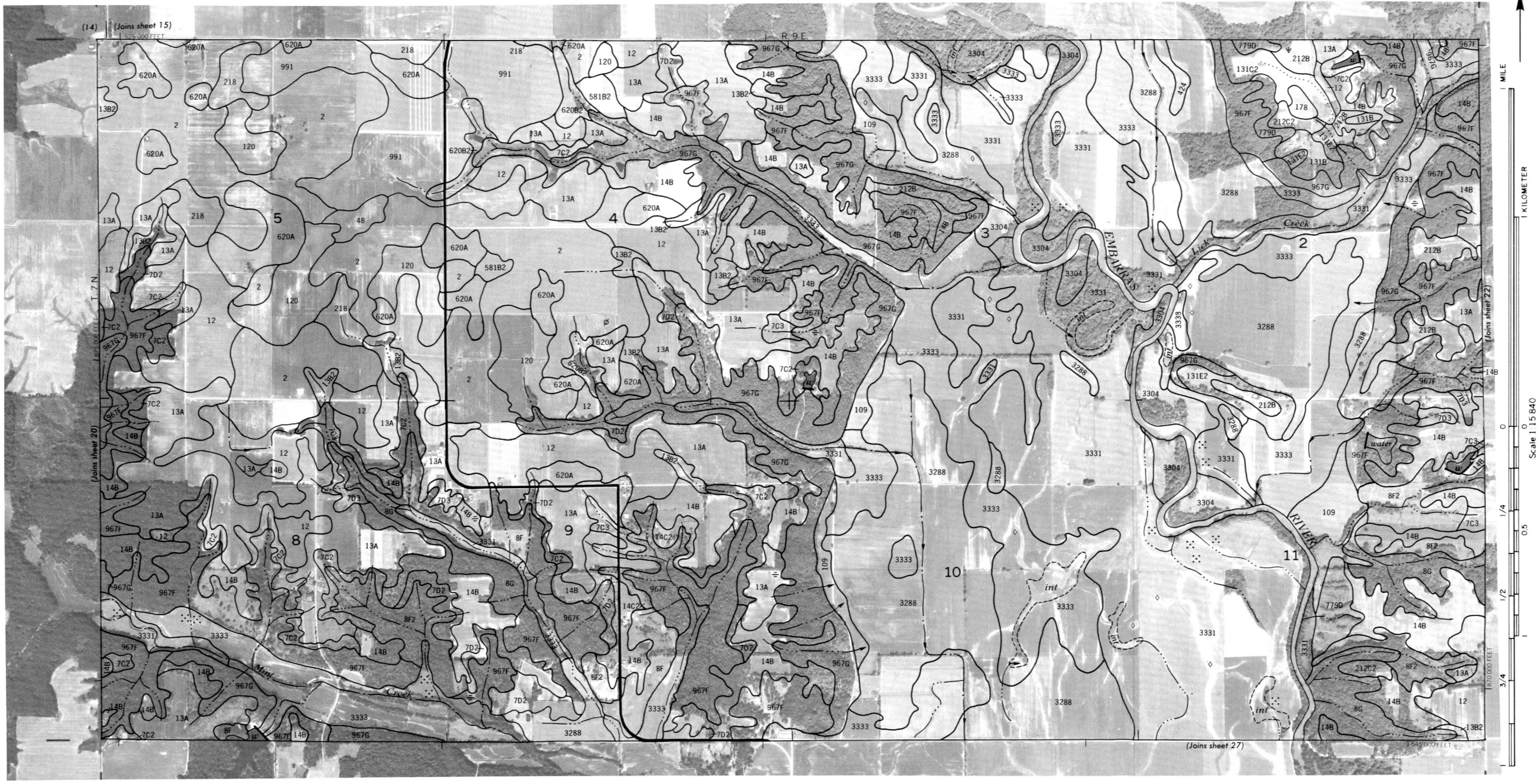

N
1 MILE
1 KILOMETER
Scale 1:15 840
(Joins sheet 10)
R. 9 E.
R. 10 E.
565 000 FEET
890 000 FEET
885 000 FEET
850 000 FEET
Rose Hill
25
30
29
28
36
31
32
33
Lick Creek
West Crooked Creek
water
T. 8 N.
(Joins sheet 15)
(Joins sheet 17)
(Joins sheet 22)
(23)


(Joins sheet 11)
R 10 E
R 11 E
570 000 FEET
890 000 FEET
T 8 N
(Joins sheet 16)
(Joins sheet 18)
(Joins sheet 23)
885 000 FEET
585 000 FEET
27
26
25
30
34
35
36
31
Crooked Creek
East
N
MILE
KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5


18
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
0.5
1/2
1
3/4
(Joins sheet 12)
R. 14 W.
(Joins sheet 17)
(Joins sheet 24)
T. 8 N.
CRAWFORD COUNTY
Panther Creek
North Fork
Embarras River
Sam's Branch
No Business Creek
27
28
29
30
31
32
33
34
885 000 FEET
890 000 FEET
590 000 FEET
605 000 FEET

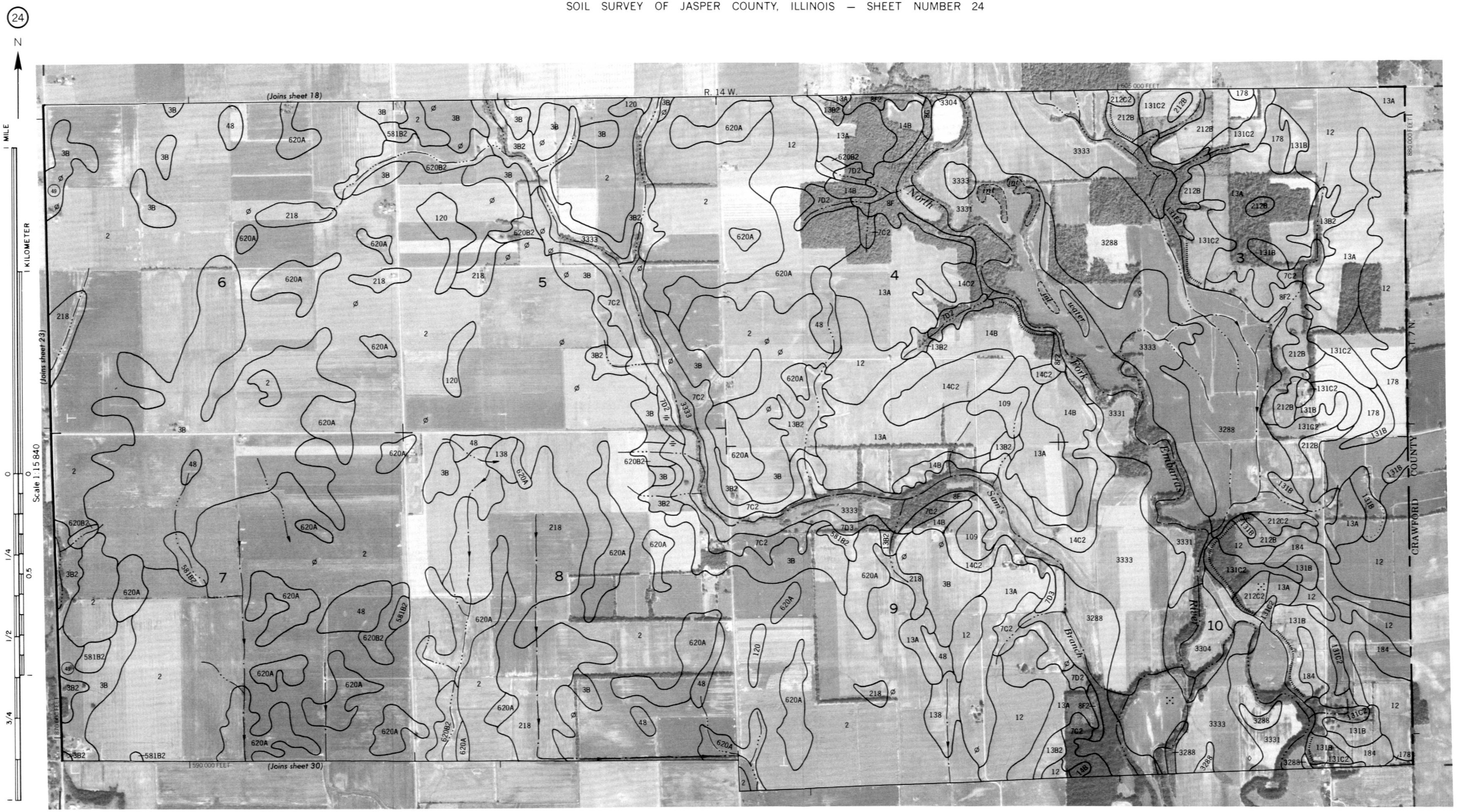

R. 8 E.
(Joins sheet 13)
(Joins sheet 20)
(Joins sheet 25)
T. 7 N.
EFFINGHAM COUNTY
Muddy Creek
490 000 FEET
880 000 FEET
500 000 FEET
875 000 FEET
N
1 MILE
1 KILOMETER
Scale 1:15 840

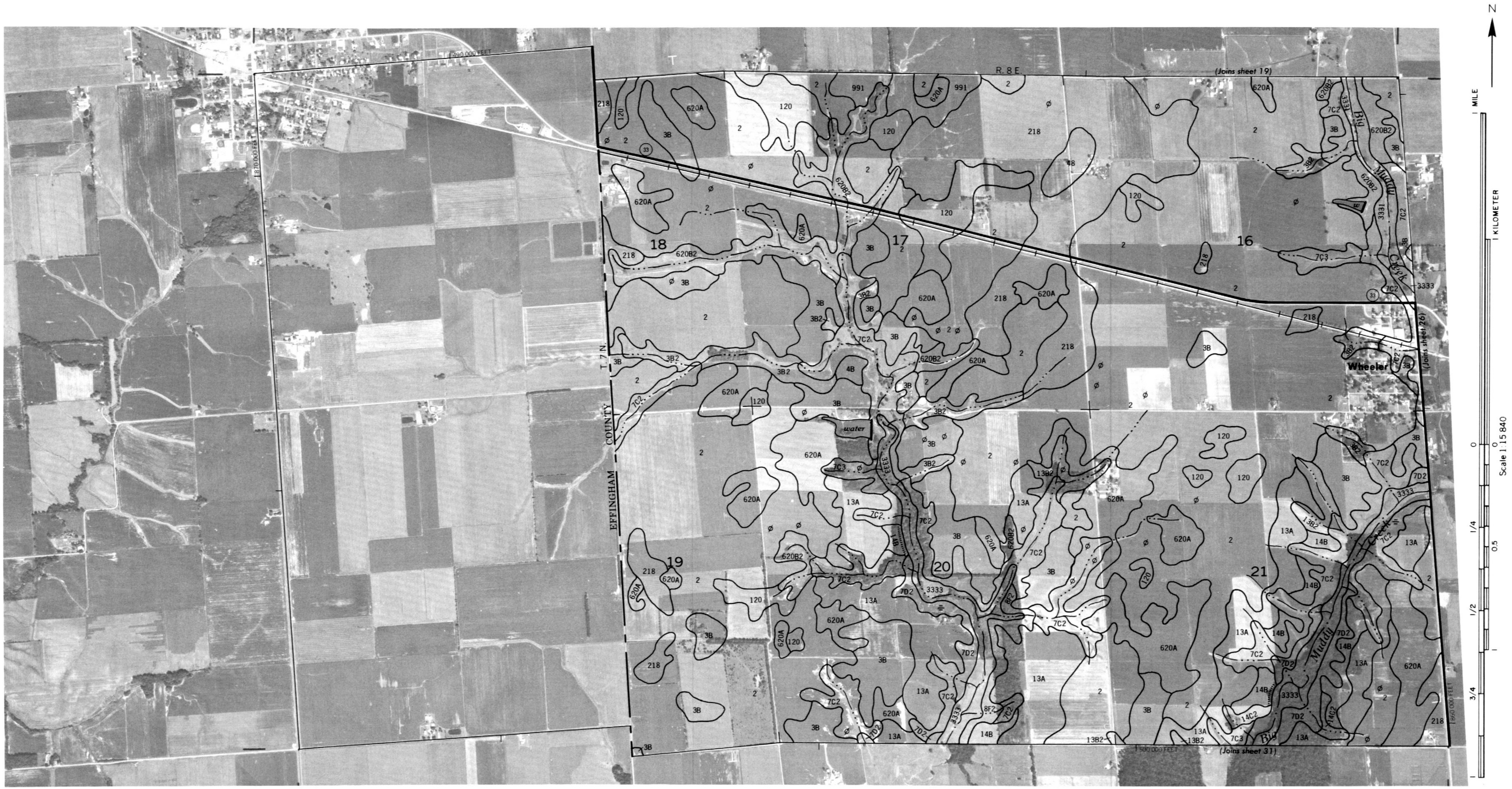
SOIL SURVEY OF JASPER COUNTY, ILLINOIS — SHEET NUMBER 20


(14)
(Joins sheet 15)
R. 9 E.
T. 7 N.
(Joins sheet 20)
(Joins sheet 22)
(Joins sheet 27)
EMBARRAS
RIVER
Lick Creek
Mint Creek
N
MILE
KILOMETER
Scale 1:15 840

SOIL SURVEY OF JASPER COUNTY, ILLINOIS — SHEET NUMBER 22

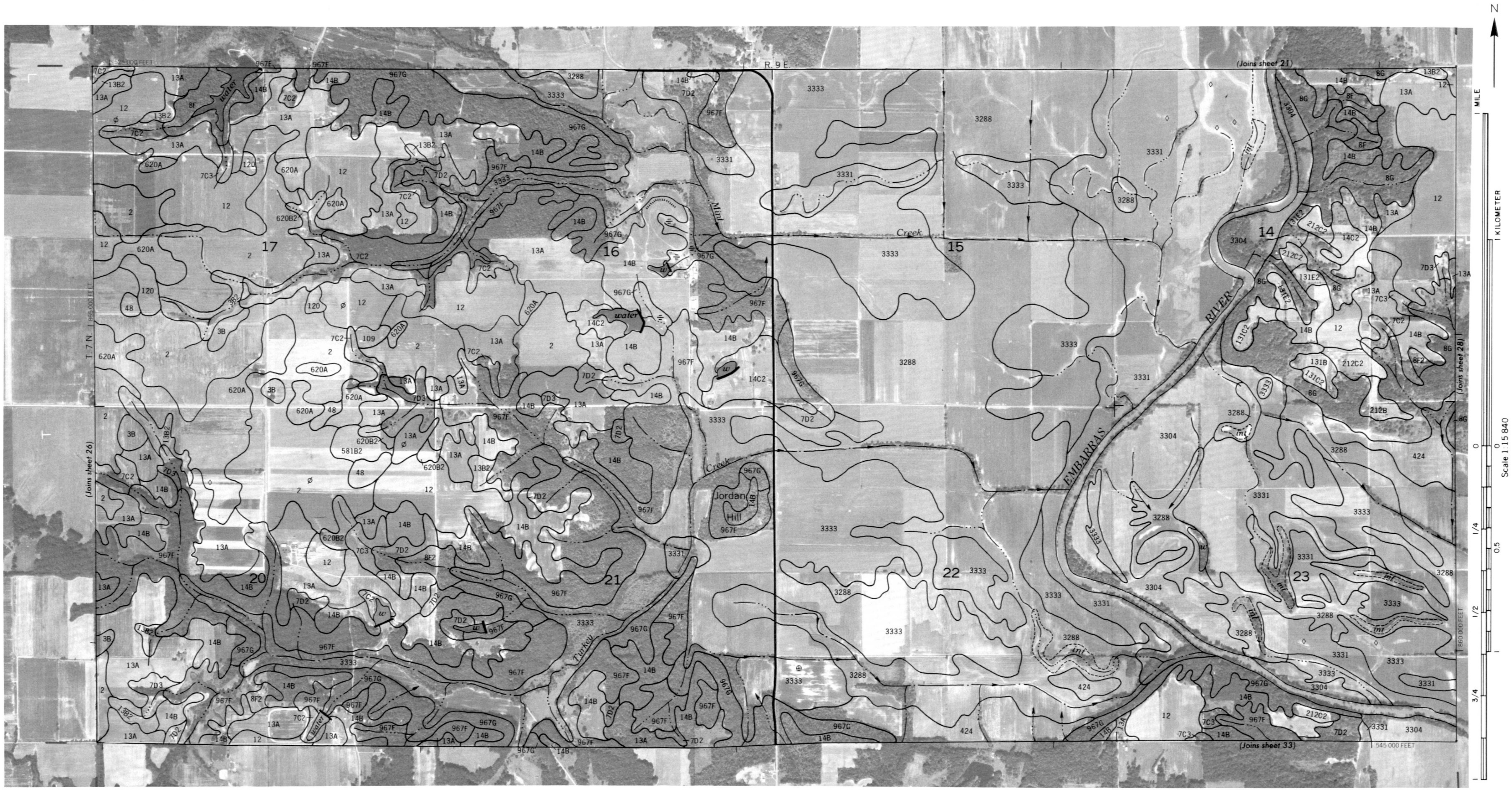

(Joins sheet 17)
(16)
570 000 FEET
R. 10 E.
R. 11 E.
(Joins sheet 22)
T. 7 N.
875 000 FEET
(Joins sheet 24)
(Joins sheet 29)
585 000 FEET
870 000 FEET
Crooked
Creek
East
water
Hunt
N
1 MILE
1 KILOMETER
Scale 1:15 840


24
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
(Joins sheet 18)
(Joins sheet 23)
(Joins sheet 30)
R. 14 W.
T. 7 N.
CRAWFORD COUNTY
590 000 FEET
605 000 FEET
880 000 FEET
870 000 FEET
North Fork
Embarras River
Sams Branch
int water
3
4
5
6
7
8
9
10



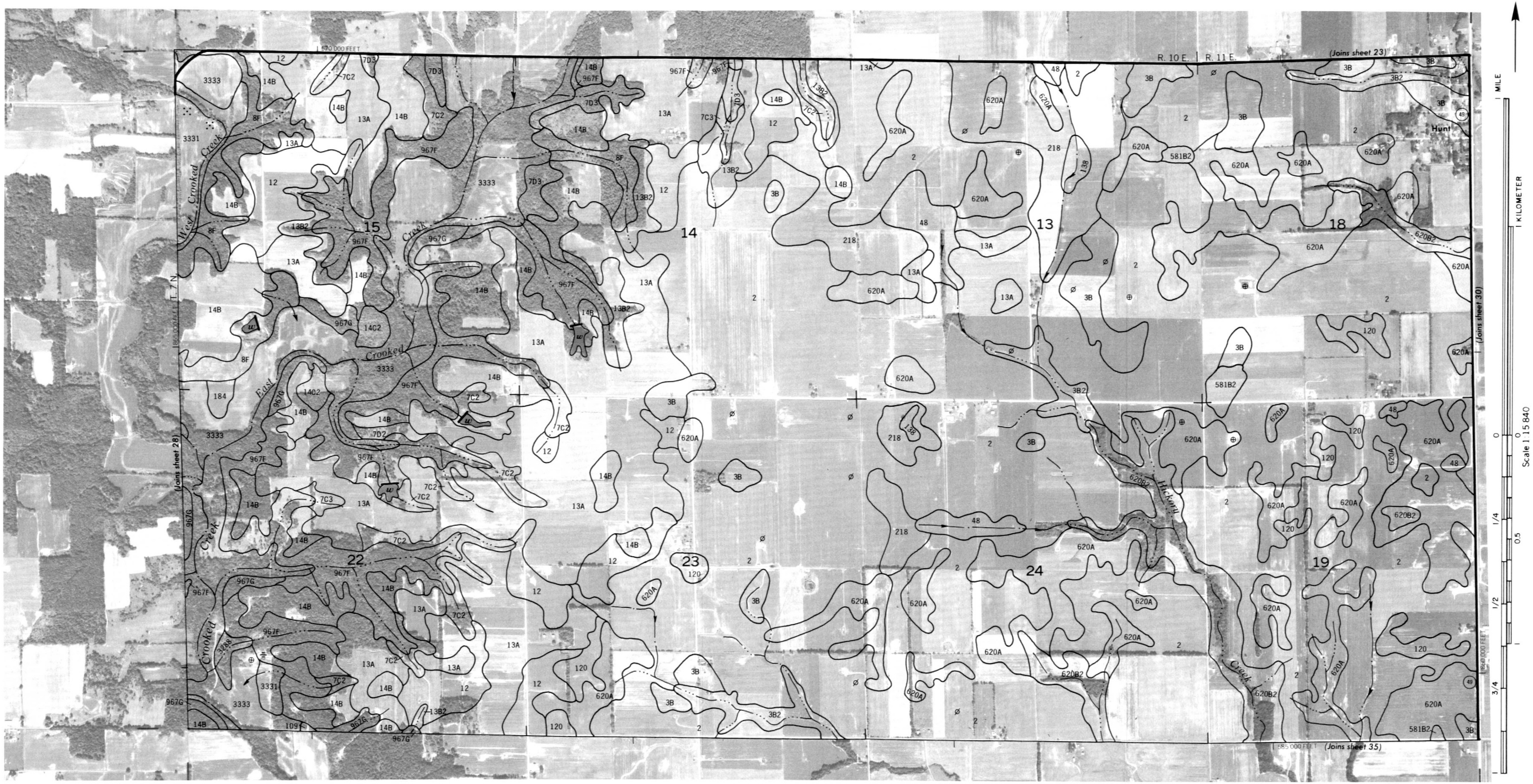
Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
(Joins sheet 20)
(Joins sheet 25)
(Joins sheet 27)
(Joins sheet 32)
R. 8 E.
R. 9 E.
T. 7 N.
520 000 FEET
505 000 FEET
Wheeler
Muddy Cr
Big
State
Turkey
Creek
13
14
15
18
19
22
23
24



(Joins sheet 21)
(Joins sheet 26)
(Joins sheet 28)
(Joins sheet 33)
R. 9 E.
T. 7 N.
Mint Creek
Turkey Creek
EMBARRAS RIVER
Jordan Hill
17
16
15
14
20
21
22
23
N
1 MILE
1 KILOMETER
Scale 1:15 840
545 000 FEET

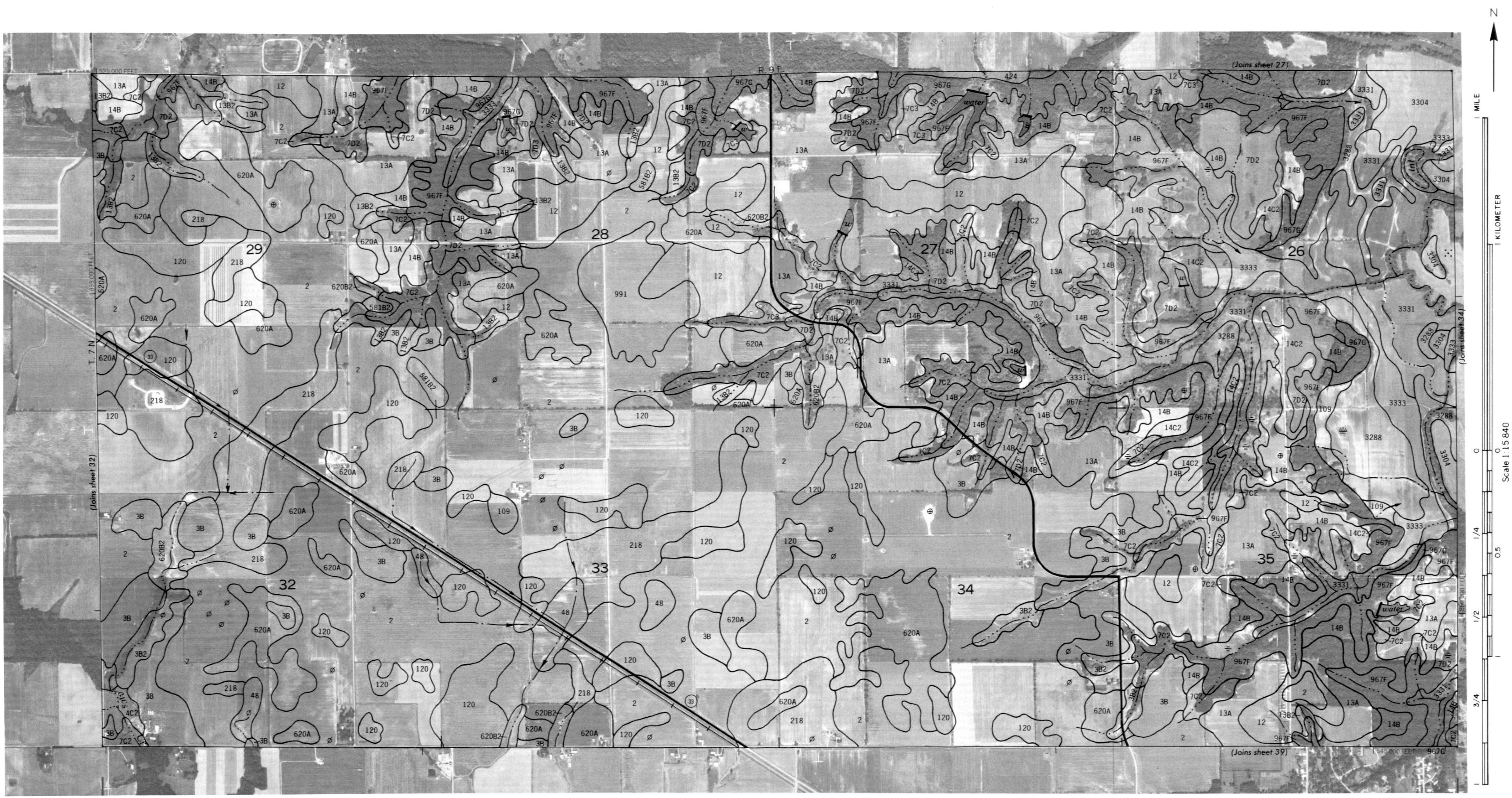

28
N
1 MILE
1 KILOMETER
Scale 1:15 840
(Joins sheet 22)
R. 9 E.
R. 10 E.
Falmouth
(Joins sheet 27)
(Joins sheet 29)
(Joins sheet 34)
T. 7 N.
13
16
17
18
19
20
21
24
SAM
PARR
STATE
PARK
water
West
Crooked
Cr


N
(Joins sheet 23)
(Joins sheet 28)
(Joins sheet 30)
(Joins sheet 35)
R. 10 E.
R. 11 E.
T. 7 N.
570 000 FEET
885 000 FEET
Hunt
West Crooked Creek
East Crooked Creek
Crooked Creek
Hickory Creek
13
14
15
18
19
22
23
24
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5


30
N
1 MILE
1 KILOMETER
Scale 1:15 840
(Joins sheet 24)
(Joins sheet 29)
(Joins sheet 36)
R. 14 W.
T. 7 N.
CRAWFORD COUNTY
North Fork Embarras River
1 605 000 FEET
1 590 000 FEET
15
16
17
18
19
20
21
22


N
R. 8 E.
T. 7 N.
EFFINGHAM COUNTY
(Joins sheet 25)
(Joins sheet 32)
(Joins sheet 37)
490 000 FEET
500 000 FEET
Muddy
Creek
Big
28
29
30
31
32
33
1 MILE
1 KILOMETER
Scale 1:15 840


N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0
0.5
(Joins sheet 26)
(Joins sheet 31)
(Joins sheet 33)
(Joins sheet 38)
R. 8 E. | R. 9 E.
T. 7 N.
520 000 FEET
855 000 FEET
850 000 FEET
505 000 FEET
27
26
25
30
34
35
36
31
Laws Creek
Sandy Creek
Lis


33
N
(Joins sheet 27)
(Joins sheet 32)
(Joins sheet 34)
(Joins sheet 39)
R 9 E
T 7 N
525 000 FEET
855 000 FEET
26
27
28
29
32
33
34
35
water
MILE
KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1
0.5

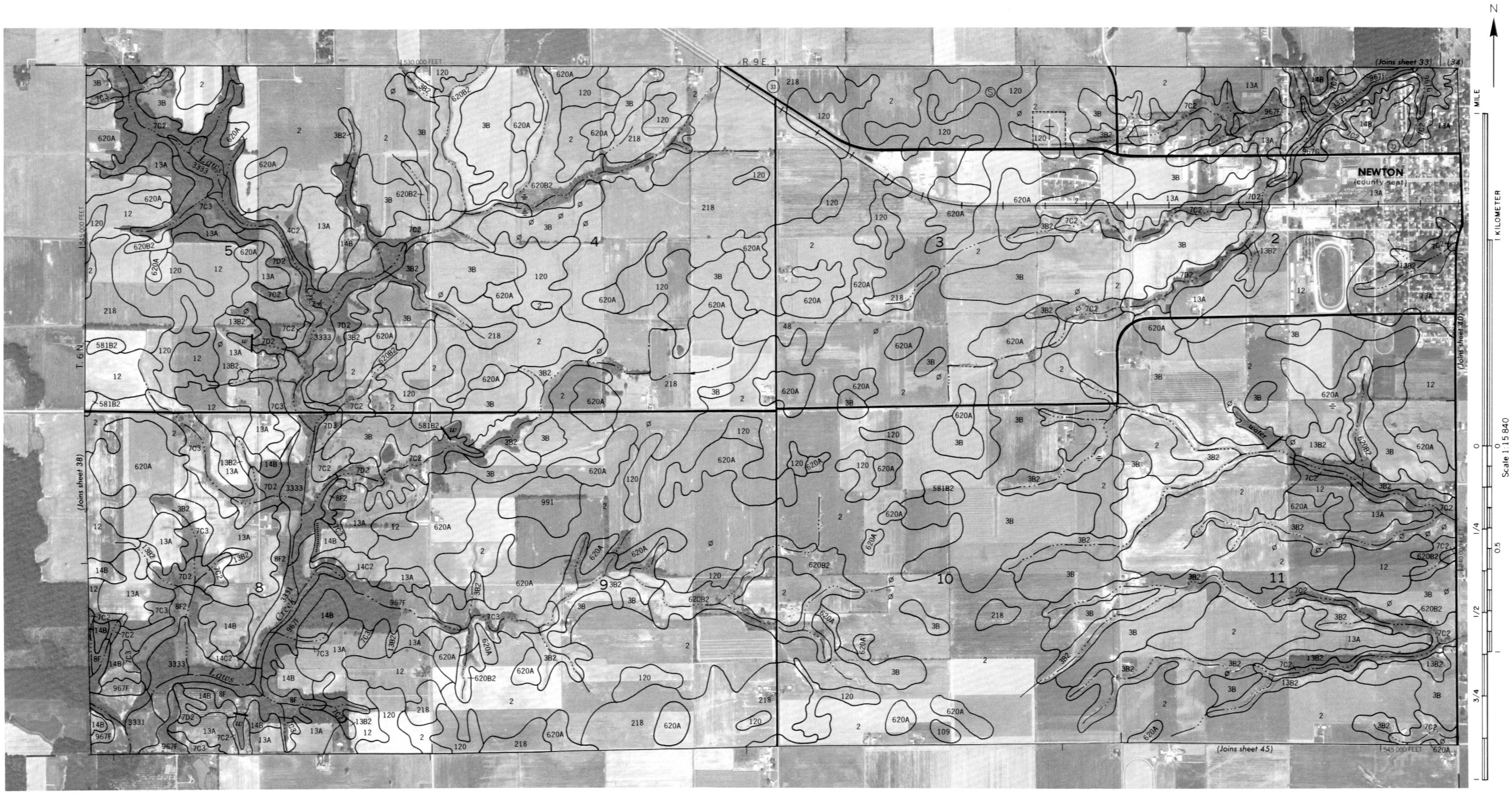

N
1 MILE
1 KILOMETER
Scale 1:15 840
(Joins sheet 28)
R. 9 E.
R. 10 E.
(Joins sheet 33)
(Joins sheet 35)
(Joins sheet 40)
(39)
(41)
EMBARRAS
RIVER
SAM PARR STATE PARK
Lake Jasper
water
NEWTON (county seat)
T. 7 N.
25
30
29
28
36
31
32
33

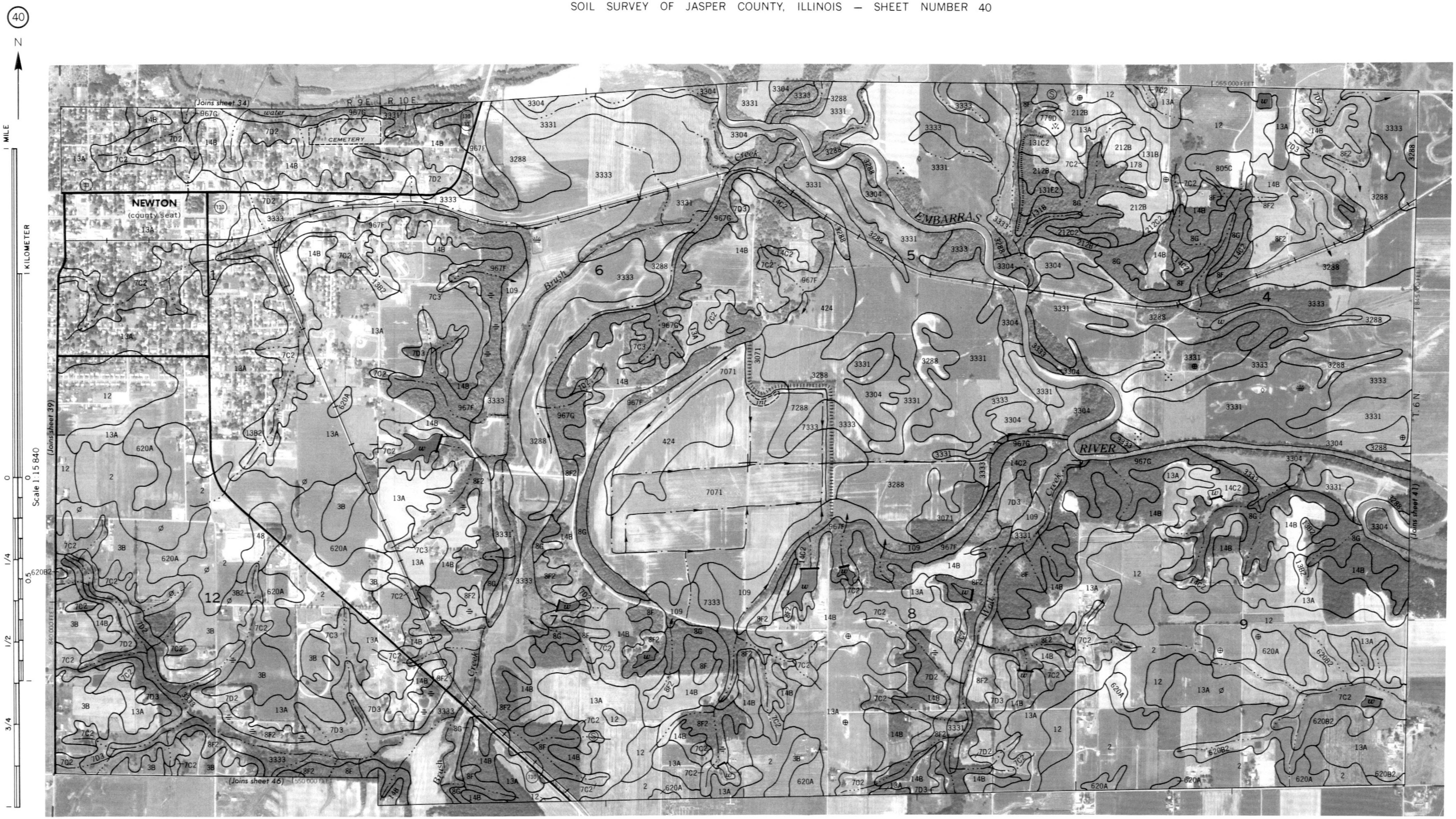

N
(Joins sheet 29)
R. 10 E.
R. 11 E.
(Joins sheet 34)
(Joins sheet 36)
(Joins sheet 41)
T. 7 N.
570 000 FEET
Crooked Creek
Camp Creek
Hickory Creek
Willow Hill
25
26
27
30
31
34
35
36
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
1


N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
(Joins sheet 30)
(Joins sheet 35)
(Joins sheet 42)
R. 14 W.
T. 7 N.
610 000 FEET
590 000 FEET
CRAWFORD COUNTY
North Fork
Embarras River
Hickory Creek
Willow Hill
27
28
29
30
31
32
33
34


37
N
(Joins sheet 31)
(Joins sheet 38)
(Joins sheet 43)
R. 8 E.
T. 6 N.
EFFINGHAM COUNTY
490 000 FEET
850 000 FEET
500 000 FEET
Big
Muddy
Creek
Crabapple
Creek
1 MILE
1 KILOMETER
Scale 1:15 840
Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
1 MILE
1 KILOMETER
Scale 1:15 840
(Joins sheet 32)
(Joins sheet 37)
(Joins sheet 39)
(Joins sheet 44)
R. 8 E. | R. 9 E.
T. 6 N.
625 000 FEET
845 000 FEET
Latona
Big Muddy Creek
Sandy Creek
Creek
water
1
2
3
6
7
10
11
12


NEWTON
(county seat)
Laws Creek
Laws Creek
R. 9 E.
T. 6 N.
(Joins sheet 33)
(34)
(Joins sheet 38)
(Joins sheet 40)
(Joins sheet 45)
530 000 FEET
545 000 FEET
840 000 FEET
845 000 FEET
water
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5


40
N
1 MILE
1 KILOMETER
Scale 1:15 840
(Joins sheet 34)
(Joins sheet 39)
(Joins sheet 41)
(Joins sheet 46)
R. 9 E.
R. 10 E.
T. 6 N.
NEWTON
(county seat)
CEMETERY
EMBARRAS
RIVER
Brush
Creek
Hurricane
Creek
565 000 FEET
550 000 FEET
840 000 FEET


(Joins sheet 35)
(Joins sheet 42)
(Joins sheet 47)
(Joins sheet 40)
R. 10 E.
R. 11 E.
T. 6 N.
570 000 FEET
545 000 FEET
540 000 FEET
585 000 FEET
Willow Hill
Crooked Creek
Camp Creek
EMBARRAS RIVER
EMBARRAS
RIVER
water
int
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5

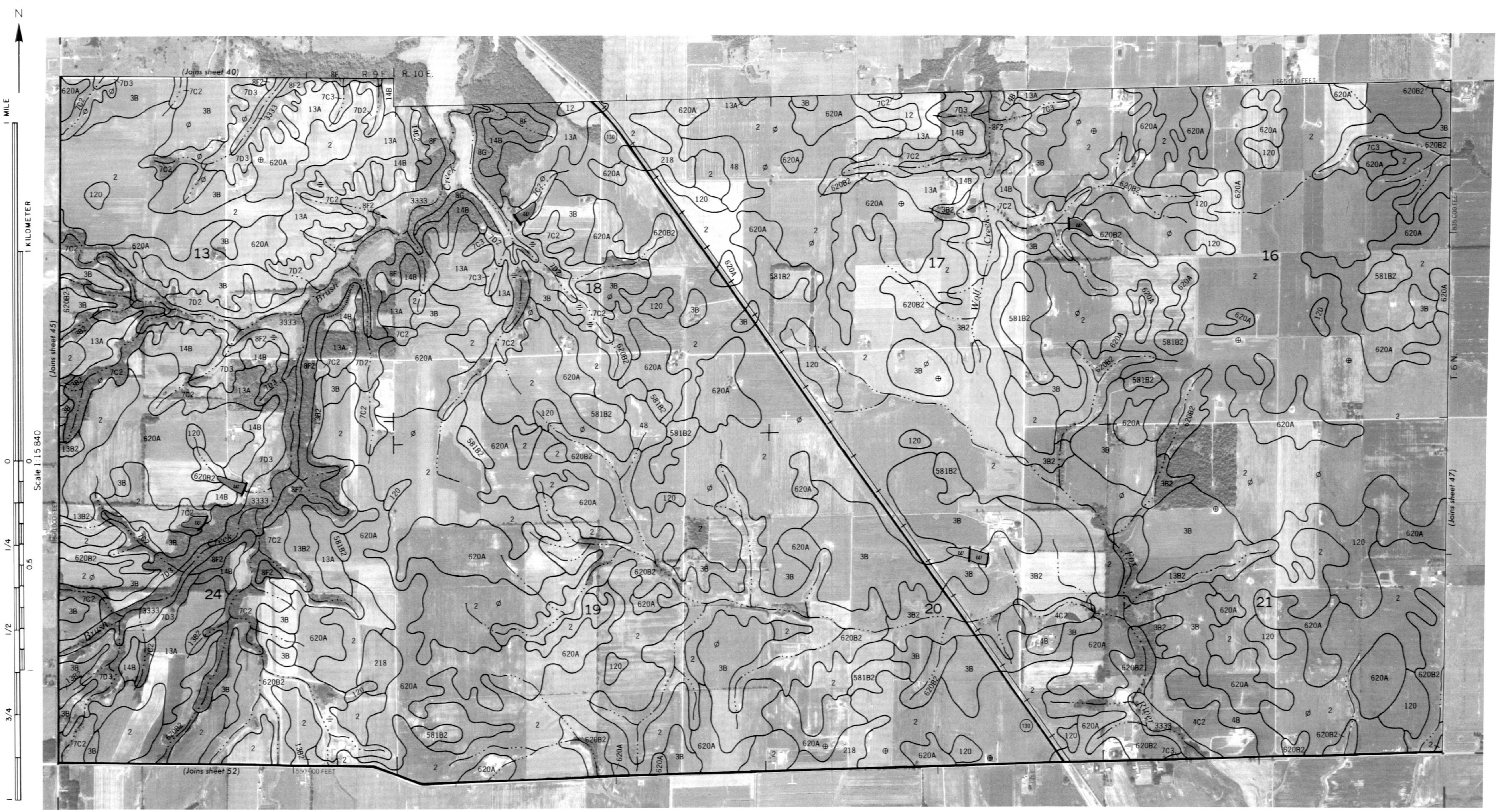

N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 36)
(Joins sheet 41)
(Joins sheet 48)
R. 14 W.
T. 6 N.
Willow Hill
Hickory Creek
Hickory Creek
Embarras River
North Fork
CRAWFORD COUNTY
590 000 FEET
840 000 FEET


N
(Joins sheet 37)
(Joins sheet 44)
(Joins sheet 49)
R. 8 E.
T. 6 N.
EFFINGHAM COUNTY
490 000 FEET
835 000 FEET
830 000 FEET
500 000 FEET
Crabapple Creek
Muddy Creek
Big Creek
water
16
17
18
19
20
21
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1
0.5


N
1 MILE
1 KILOMETER
Scale 1:15 840
(Joins sheet 38)
(Joins sheet 43)
(Joins sheet 45)
(Joins sheet 50)
R. 8 E.
R. 9 E.
T. 6 N.
520 000 FEET
505 000 FEET
330 000 FEET
335 000 FEET
Big Muddy Creek
Sandy Creek
Lates Creek
Long Branch
NEWTON LAKE
NEWTON LAKE FISH AND WILDLIFE AREA
Newton Lake
water

45

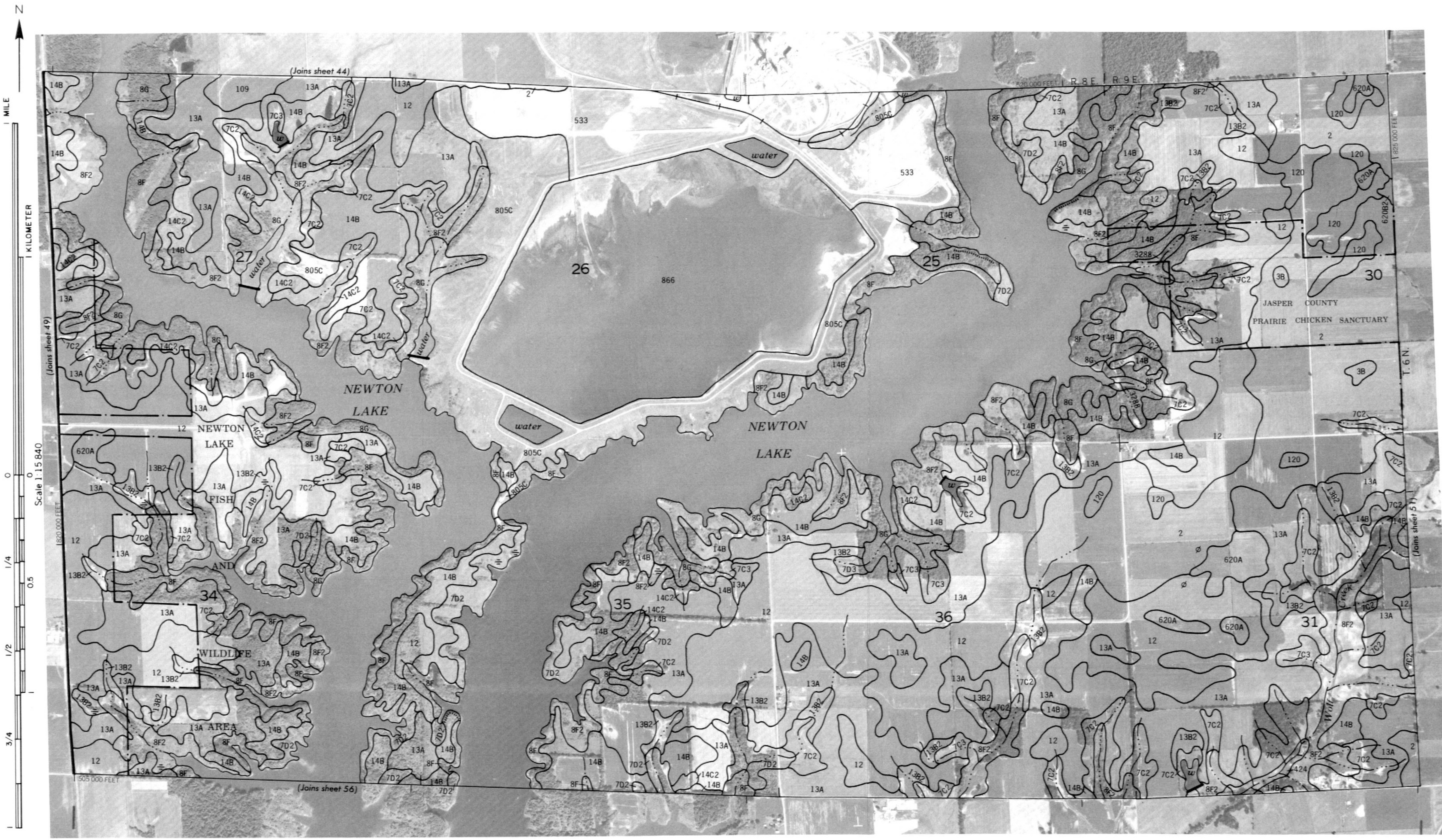

R. 9 E.
T. 6 N.
(Joins sheet 39)
(Joins sheet 44)
(Joins sheet 46)
(Joins sheet 51)
JASPER COUNTY PRAIRIE CHICKEN SANCTUARY
Long Branch
Brush Creek
N
1 MILE
1 KILOMETER
Scale 1:15 840

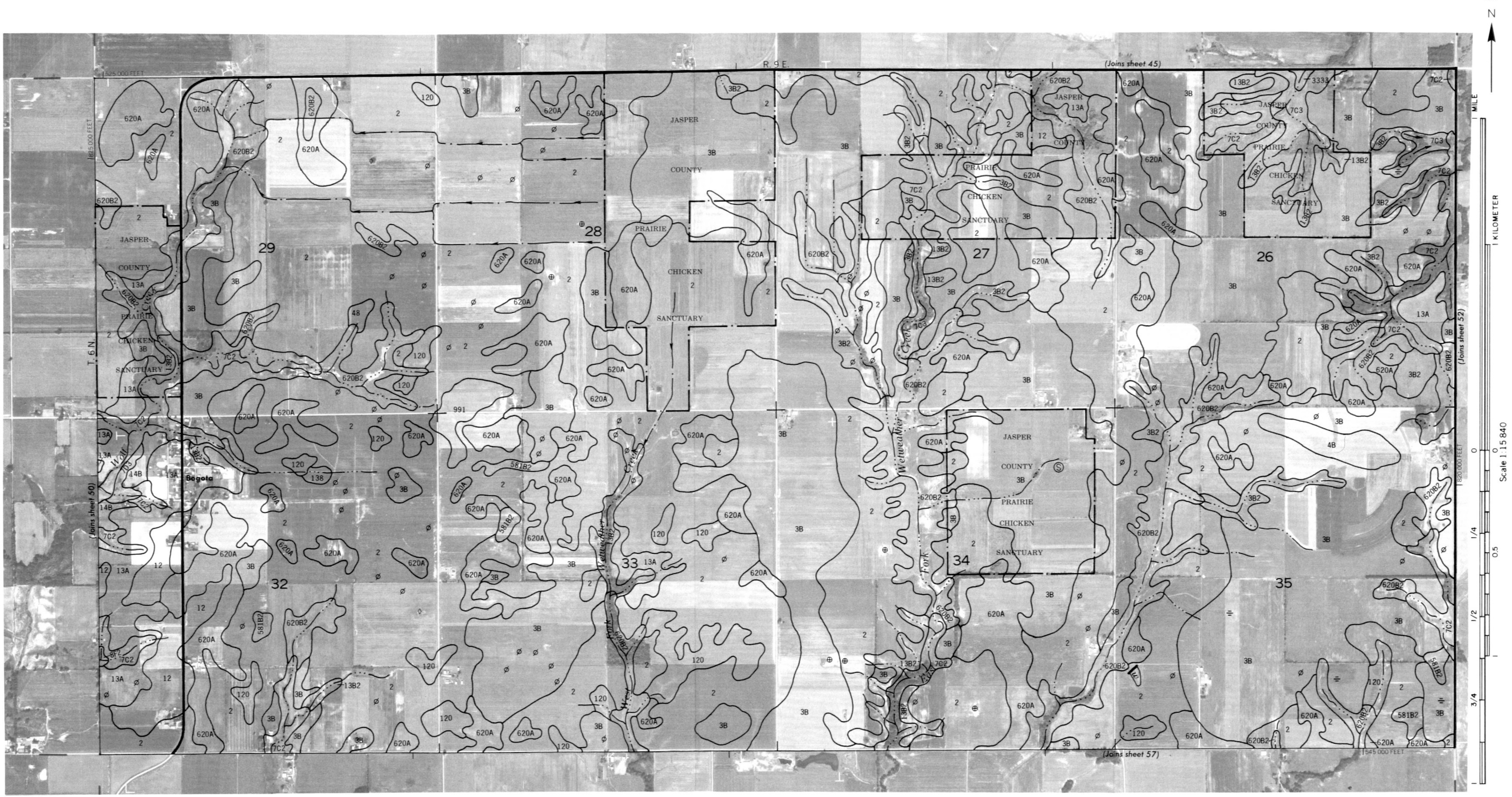

N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0
0.5
(Joins sheet 40)
(Joins sheet 45)
(Joins sheet 52)
(Joins sheet 47)
R. 9 E.
R. 10 E.
T. 6 N.
565 000 FEET
550 000 FEET
Brush
Creek
Wolf
Creek
Fox
River
130
13
16
17
18
19
20
21
24


R. 10 E.
R. 11 E.
T. 6 N.
(Joins sheet 41)
(Joins sheet 46)
(Joins sheet 48)
(Joins sheet 53)
1 570 000 FEET
835 000 FEET
585 000 FEET
850 000 FEET
EMBARRAS
RIVER
13
14
15
18
19
22
23
24
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5


N
1 MILE
1 KILOMETER
Scale 1:15 840
(Joins sheet 42)
(Joins sheet 47)
(Joins sheet 54)
R. 14 W.
605 000 FEET
590 000 FEET
1 835 000 FEET
1 830 000 FEET
T. 6 N.
CRAWFORD COUNTY
North Fork Embarras River
15
16
17
18
19
20
21
22


N
(Joins sheet 43)
(Joins sheet 50)
(Joins sheet 55)
R 8 E
T. 6 N.
EFFINGHAM COUNTY
Big Muddy Creek
490 000 FEET
825 000 FEET
820 000 FEET
505 000 FEET
28
29
30
31
32
33
1 MILE
1 KILOMETER
Scale 1:15 840


N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
0.5
1/2
3/4
(Joins sheet 44)
(Joins sheet 49)
(Joins sheet 51)
(Joins sheet 56)
R. 8 E.
R. 9 E.
T. 6 N.
520 000 FEET
825 000 FEET
820 000 FEET
505 000 FEET
NEWTON LAKE
NEWTON LAKE FISH AND WILDLIFE AREA
JASPER COUNTY PRAIRIE CHICKEN SANCTUARY
Wolf Creek
water
25
26
27
30
31
34
35
36
866
533
805C
14B
13A
12
8F
8F2
8G
7C2
7D2
14C2
13B2
120
620A
3288
2


N
(Joins sheet 45)
R. 9 E.
T. 6 N.
(Joins sheet 50)
(Joins sheet 52)
(Joins sheet 57)
525 000 FEET
835 000 FEET
820 000 FEET
545 000 FEET
JASPER COUNTY PRAIRIE CHICKEN SANCTUARY
Bogota
Wolf Creek
Wetweather Creek
West Fork Wetweather Creek
26
27
28
29
32
33
34
35
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5


N
1 MILE
1 KILOMETER
Scale 1:15 840
(Joins sheet 46)
R. 9 E.
R. 10 E.
(Joins sheet 51)
(Joins sheet 53)
(Joins sheet 58)
(59)
T. 6 N.
Boos
Fox River
Richland Creek
25
28
29
30
31
32
33
36
565 000 FEET
820 000 FEET
825 000 FEET
550 000 FEET


N
(Joins sheet 47)
(Joins sheet 52)
(Joins sheet 54)
(Joins sheet 59)
R. 10 E.
R. 11 E.
T. 6 N.
Ste. Marie
570 000 FEET
585 000 FEET
1 MILE
1 KILOMETER
Scale 1:15 840


54
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
0.5
1/2
3/4
1
(Joins sheet 48)
(Joins sheet 53)
(Joins sheet 60)
R. 14 W.
EMBARRAS
Ste. Marie
water
RIVER
EMBARRAS
RIVER
North Fork Embarras River
29
30
31
32
33
34
28
27
CRAWFORD COUNTY
T. 6 N.
590 000 FEET
820 000 FEET
825 000 FEET
610 000 FEET

N

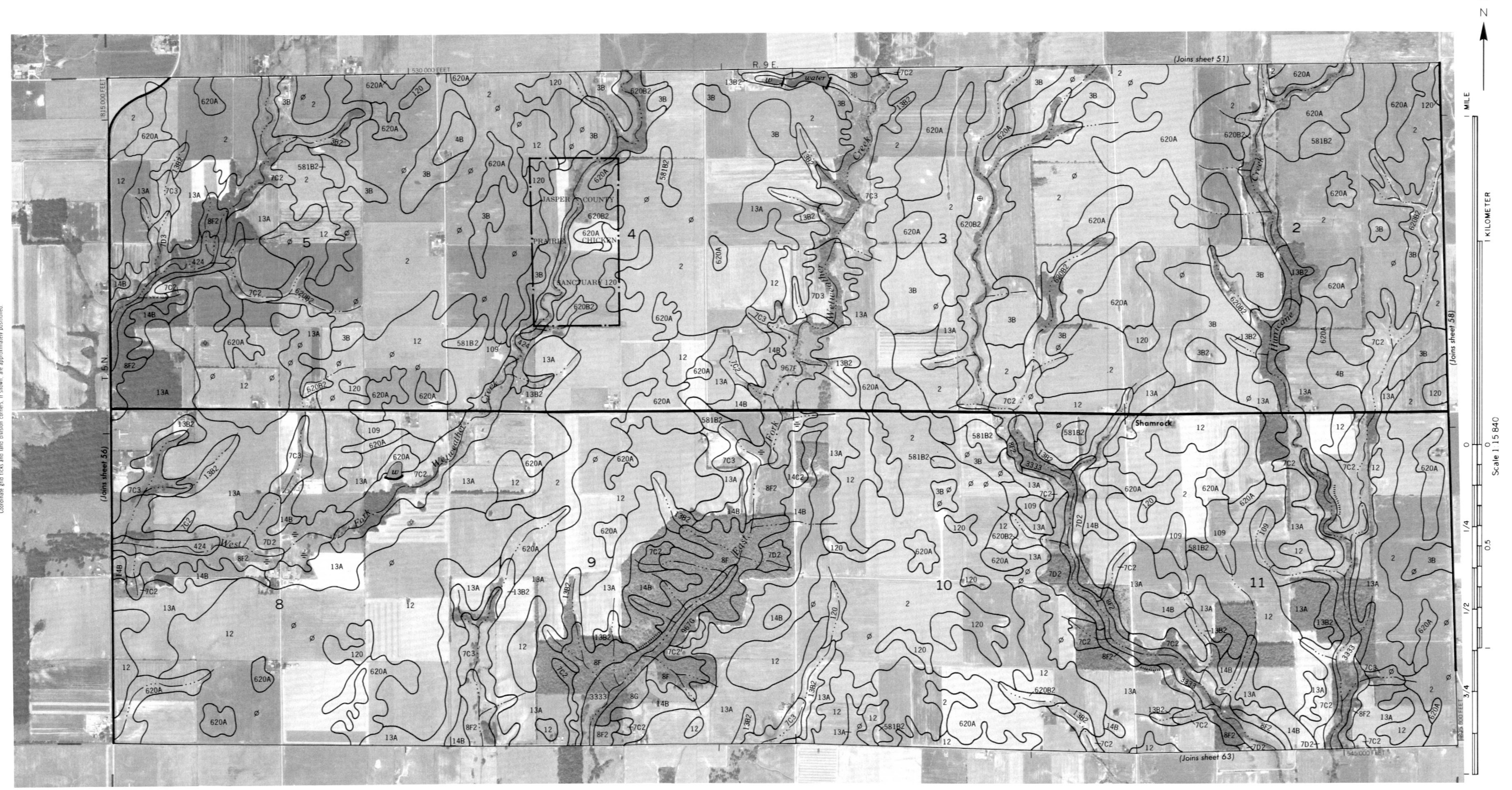
1 MILE

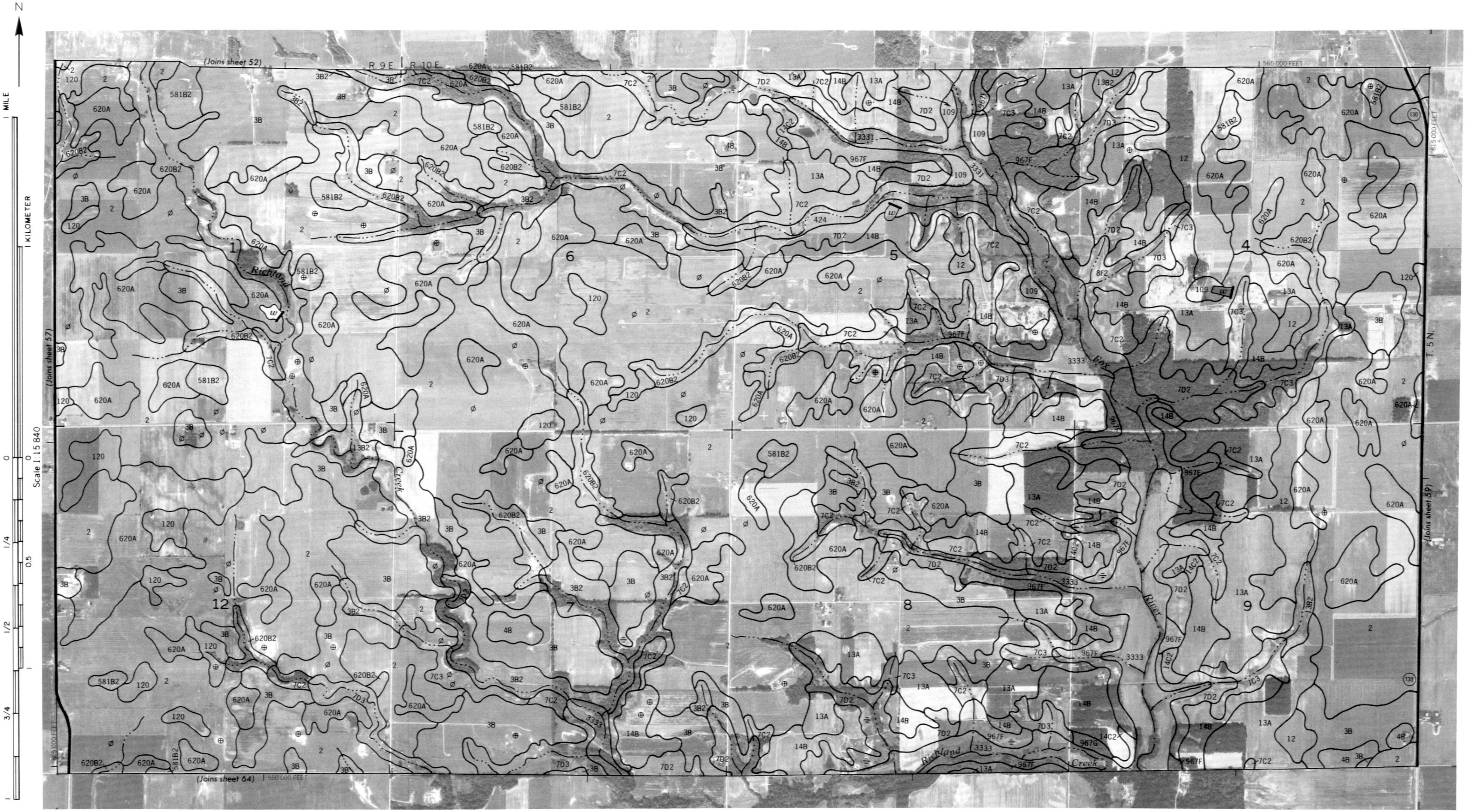
1 KILOMETER

Scale 1:15 840

Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
1 MILE
1 KILOMETER
Scale 1:15 840
(Joins sheet 50)
(Joins sheet 55)
(Joins sheet 57)
(Joins sheet 62)
NEWTON LAKE FISH AND WILDLIFE AREA
NEWTON LAKE
R. 8 E. | R. 9 E.
T. 5 N.
525 000 FEET
815 000 FEET
810 000 FEET
510 000 FEET
Wolf Creek
Weather
West Fork Wetweather Creek


N
(Joins sheet 51)
(Joins sheet 58)
(Joins sheet 63)
(Joins sheet 56)
R. 9 E.
T. 5 N.
530 000 FEET
815 000 FEET
545 000 FEET
JASPER COUNTY PRAIRIE CHICKEN SANCTUARY
Shamrock
West Fork Wetweather Creek
East Fork
Hurricane Creek
1 MILE
1 KILOMETER
Scale 1:15 840
Coordinate grid ticks and land division corners, if shown, are approximately positioned


N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
(Joins sheet 52)
R. 9 E.
R. 10 E.
565 000 FEET
815 000 FEET
T. 5 N.
(Joins sheet 57)
(Joins sheet 59)
(Joins sheet 64)
550 000 FEET
Richland
Creek
Fox
River
Richland
Creek
1
4
5
6
7
8
9
12
130

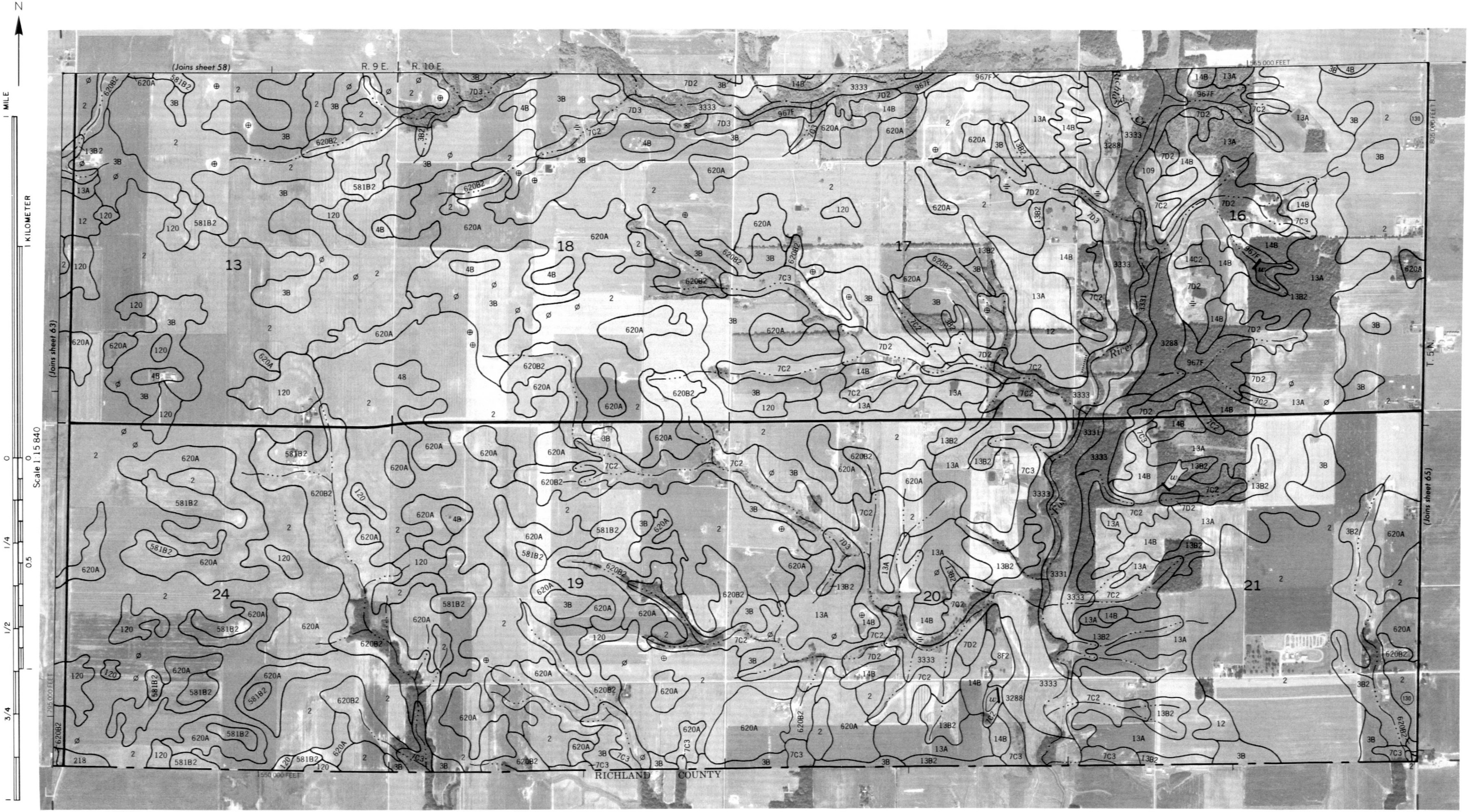
Coordinate grid ticks and land division corners, if shown, are approximately positioned


60
N
(Joins sheet 54)
R. 14 W.
(Joins sheet 59)
(Joins sheet 66)
EMBARRAS
RIVER
Dead
River
Pond Grove
CRAWFORD COUNTY
T. 5 N.
1 MILE
1 KILOMETER
Scale 1:15 840
610 000 FEET
590 000 FEET
810 000 FEET
815 000 FEET


R. 8 E.
(Joins sheet 55)
(Joins sheet 62)
T. 5 N.
CLAY COUNTY
CLAY COUNTY
Limestone Creek
Muddy Creek
Big
16
17
18
19
20
21
490 000 FEET
505 000 FEET
800 000 FEET
805 000 FEET
N
1 MILE
1 KILOMETER
Scale 1:15 840


N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0
0.5
(Joins sheet 56)
(Joins sheet 61)
(Joins sheet 63)
R. 8 E. | R. 9 E.
T. 5 N.
15
14
13
18
22
23
24
19
Weather Creek
Walt Creek
West Fork
Weathervane Creek
water
CLAY COUNTY
RICHLAND COUNTY
525 000 FEET
510 000 FEET
800 000 FEET
805 000 FEET


N
(Joins sheet 57)
(Joins sheet 62)
(Joins sheet 64)
R. 9 E.
T. 5 N.
530 000 FEET
545 000 FEET
805 000 FEET
795 000 FEET
RICHLAND COUNTY
Wetweather
Creek
East
Fork
Hurricane
Creek
water
water
17
16
15
14
20
21
22
23
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
0.5
Scale 1:15 840


N
1 MILE
1 KILOMETER
0
1/4
0.5
1/2
3/4
1
Scale 1:15 840
(Joins sheet 58)
(Joins sheet 63)
(Joins sheet 65)
R. 9 E.
R. 10 E.
T. 5 N.
565 000 FEET
805 000 FEET
795 000 FEET
550 000 FEET
RICHLAND COUNTY
Fox River
Crooked Cr.
13
16
17
18
19
20
21
24
130


N
(Joins sheet 59)
R. 10 E.
R. 11 E.
T. 5 N.
(Joins sheet 64)
(Joins sheet 66)
570 000 FEET
805 000 FEET
800 000 FEET
585 000 FEET
West Liberty
RICHLAND COUNTY
15
14
13
18
22
23
24
19
1 MILE
1 KILOMETER
Scale 1:15 840


N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
(Joins sheet 60)
(Joins sheet 65)
R. 14 W.
T. 5 N.
610 000 FEET
800 000 FEET
590 000 FEET
18
17
16
15
19
20
21
22
EMBARRAS
RIVER
River
Dead
water
Rafetown
RICHLAND
COUNTY
CRAWFORD
COUNTY